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State of Connecticut
PUBLIC DOCUMENT No. 18

THIRTY-FOURTH ANNUAL REPORT

OF THE

SECRETARY

OF THE

Connecticut Board of Agriculture

1900

PRINTED BY ORDER OF THE LEGISLATURE

Hartford Press

THE CASE, LOCKWOOD & BRAINARD COMPANY

1901

To the Governor of the State of Connecticut :

In accordance with the provisions of the Act creating a State Board of Agriculture, I have the honor to present the Report for 1900.

T. S. GOLD, *Secretary*.

WEST CORNWALL, December 1, 1900.

STATE BOARD OF AGRICULTURE.

1899-1900.

HIS EXCELLENCY GEORGE E. LOUNSBURY, *ex officio*.

APPOINTED BY THE GOVERNOR.

	Term Expires.
CHARLES L. TUTTLE, . . . Hartford,	1901
JAMES F. BROWN, . . . North Stonington,	1901
CHARLES E. CHAPMAN, . . . Westbrook,	1903
IVERSON C. FANTON, . . . Westport,	1903

APPOINTED BY THE GENERAL ASSEMBLY.

Hartford County, . . .	EDMUND HALLADAY, Suffield,	1901
New Haven County, . . .	FRED'K DOOLITTLE, Cheshire,	1901
New London County, . . .	E. JUDSON MINER, Bozrah,	1901
Fairfield County, . . .	SEAMAN MEAD, Greenwich,	1901
Windham County, . . .	NATHANIEL G. WILLIAMS, Brooklyn,	1903
Litchfield County, . . .	EDWIN G. SEELEY, Roxbury,	1903
Middlesex County, . . .	ELBERT D. HAMMOND, Cromwell,	1903
Tolland County, . . .	CHAS. A. THOMPSON, Melrose,	1903

OFFICIAL LIST.

GOVERNOR GEORGE E. LOUNSBURY, *President*.

EDWIN G. SEELEY,	Roxbury,	<i>Vice-President</i>
T. S. GOLD,	West Cornwall,	<i>Secretary</i>
CHAS. A. THOMPSON,	Melrose,	<i>Treasurer</i>
Dr. E. H. JENKINS,	New Haven,	<i>Chemist</i>
Prof. B. F. KOONS,	Storrs,	<i>Entomologist</i>
Dr. W. C. STURGIS,	New Haven,	<i>Botanist</i>
N. S. PLATT,	New Haven,	<i>Pomologist</i>

Auditors.

FRED. DOOLITTLE,

SEAMAN MEAD,

E. JUDSON MINER.

REPORT.

AGRICULTURAL FAIRS IN CONNECTICUT, 1900.

With Visiting Delegates.

New London County, Sept. 3-5. Chas. E. Chapman.

Windham County, Sept. 18-20. E. J. Miner.

Beacon Valley, Sept. 18-19. N. S. Platt.

Berlin, Sept. 26. Seaman Mead.

Branford, Sept. 18-20. Chas. E. Chapman.

Chester, Oct. 3. E. J. Miner.

Danbury, Oct. 1-6. E. G. Seeley, I. C. Fanton, and E. Halladay.

Farmington Valley, Sept. 6-7. E. D. Hammond.

Granby, Sept. 26-27. E. Halladay.

Guilford, Sept. 26. Seaman Mead.

Harwinton, Oct. 2. E. G. Seeley.

Madison, Oct. 3. N. S. Platt.

New Milford, Sept. 11-13. E. G. Seeley.

Newtown, Sept. 25-27. Chas. A. Thompson.

Orange, Sept. 12-13. I. C. Fanton.

Putnam Park and Fair Corpn., Sept. 11-13. James F. Brown.

Rockville Fair Asso., Sept. 18-20. C. L. Tuttle, E. C. Chapman.

Simsbury, Oct. 3-4. Chas. L. Tuttle.

Southington, Sept. 3-4. F. Doolittle.

Stafford Springs, Oct. 2-4. N. G. Williams.

Suffield, Sept. 18-19. E. D. Hammond.

Union (Monroe, etc.), Sept. 18-19. F. Doolittle.

Union (Somers, etc.), Sept. 26. Chas. A. Thompson.

Wallingford, Sept. 26-27. N. S. Platt.
Waterbury, Sept. 20-21.
Wethersfield Grange Corp'n., Oct. 2-4. E. D. Hammond.
Willimantic Fair Asso., Sept. 25-27. C. L. Tuttle.
Windsor, Sept. 12-14. Chas. A. Thompson.
Woodstock, Sept. 17-19. J. F. Brown.
Wolcott, Oct. 10. I. C. Fanton.
Connecticut Hort. Soc.,* Hartford. J. F. Brown.
Connecticut Dairy Asso., Hartford, Jan. 16-18. S. Mead,
N. G. Williams.
Connecticut Pom. Soc., Middletown, Oct. 6-7. I. C. Fanton.

FARMERS' INSTITUTES IN 1900.

South Killingly, Feb. 6; Weston, Feb. 6; Easton Center, Feb. 7; Collinsville, Feb. 7; Guilford, Feb. 20; Watertown, Feb. 21; South Britain, Feb. 27; Coventry, March 1; Windsor, March 13 and 20; Wapping, March 14; Shelton, March 21; Tolland, March 24. These institutes were held under conditions offered in a Prospectus arranged by a joint committee of the Board, and of the two Experiment Stations.

The Prospectus for 1901 offers still greater attractions in number of speakers and range of subjects.

The Institutes in the past have been generally successful; the attendance has been good, excepting bad weather, which, though not desired, must be endured, especially by the speaker, who may have traveled fifty miles to meet an audience that are kept at home in fear of a few drops of water, or a torrent, while he sits in the village store on a barrel waiting for a return train. Even agriculture furnishes no more uncertainties and surprises than does the weather, and a man who cannot endure this with equanimity is no fit person to address a Farmers' Institute.

* April —, June 13-14, July —, about Sept. 6-7, Nov. 8-10.

Experience teaches that one subject is sufficient for a session, and that it is a mistake to crowd the program with more than one speaker. The Question-box may properly come in to fill any gap, and to introduce subjects of particular interest in the locality, or to meet the wants of the inquirer. Given one good speaker who can present his subject in all its leading points in less than one hour and stand the questioning of a wide-awake audience for another hour, and you have a good institute, so that you will desire another; for your stock of knowledge is increased, or the old stock so refreshed that you are encouraged to put it into practice.

We desire to reach all parts of the State with these Institutes, and the terms are made easy for any community. Some advise us to go and hold meetings where we are not asked, to beat the bush like a traveling showman, and tell the people what good things we have in store. Others say that this will prove a waste of energy — that may better be applied to more fortunate and appreciative localities.

PROSPECTUS.

Farmers Institutes by the Connecticut State Board of Agriculture, in co-operation with the State and Storrs Experiment Stations, for 1901.

A committee representing the State and Storrs Agricultural Experiment Stations, and the Committee on Institutes, from the State Board of Agriculture, have formulated the following plan of Farmers' Institutes for the winter. It is hoped that Granges, Farmers' Clubs, and individuals will take an interest in this work and make early applications and arrangements for an Institute, so that the committee may be able to furnish the selected speakers. It is the wish of the committee to distribute the work as uniformly over the State as possible.

The plan is to hold at least two or three Institutes in each county before April 1st.

The Board pays for printing and traveling expenses. The service of the speakers is rendered without cost.

It is expected that persons applying for Institutes will furnish a suitable hall, local transportation for speakers and visitors, music if desired, and entertainment by collation or otherwise, unless there are convenient hotel accommodations.

When application for Institutes is made, four speakers and subjects may be selected from the list, and two of them may be expected to meet the call, but each speaker has the privilege of sending a substitute in case of disability from illness or otherwise.

Applications for Institutes should be made to the Secretary at an early date, giving post-office, name of railroad station, name of hall, and distance from railroad station. Signify the day of the week preferred. The Secretary should have three weeks' notice to send to speakers and print program.

Attention to these details will save much delay in correspondence. As good speakers are offered, the responsibility of securing a good attendance must rest with each locality. Local speakers, especially ladies, will be welcome at these Institutes. An exhibit of fruit and flowers is solicited.

The Question-box will be an important feature, allowing the introduction of any topic pertaining to agriculture.

A large choice of speakers and subjects is offered, but if we are obliged in some cases to send substitutes, we trust this will prove no disappointment. Some other speakers have been solicited, so that some may be sent as substitutes who are not on the list. Please bear in mind that our number of lady speakers is limited, and they must be excused from answering calls if too numerous.

After a Grange or Farmers' Club or neighborhood has decided to apply for an Institute, a committee should be appointed with whom all of the local arrangements should rest. This committee should designate the place for holding the meeting, appoint one or two local speakers, provide music, arrange for transportation, collation, and otherwise enlist local interest.

LIST OF SPEAKERS AND SUBJECTS.

CONNECTICUT EXPERIMENT STATION.

Dr. E. H. JENKINS.

Farm Sanitation.

Sewage Disposal. Illustrated by Stereopticon.

Fermentation of Tobacco.

Cattle Feeding, and Cattle Feeds now in the market.

Prof. W. E. BRITTON.

Planting to improve Rural Home Grounds with Native Trees and Shrubs.

Winter Gardening.

Our Insect Acquaintances. Illustrated by Stereopticon.

Dr. W. C. STURGIS.

Flowers and Fruit; a brief talk on Fertilization and Fruit Production.

Leaves and Fruit; the part which Foliage plays in Fruit Production.

Bacteria and their work, with special reference to Soil-bacteria.

Prof. A. L. WINTON.

Agriculture in Other Lands. (Illustrated by lantern slides.)

How Plants Eat, Drink, and Grow. (Illustrated by lantern slides.)

The Adulteration of Foods. (Illustrated by adulterated foods bought in Connecticut.)

STORRS EXPERIMENT STATION.**Dr. W. O. ATWATER.**

The Farmer and his Food.

Prof. C. S. PHELPS.

Nitrogenous Feeding Stuffs.

Home Mixed Fertilizers.

The Evolution of the Dairy Cow. (Illustrated by Stereopticon.)

Grasses and other Forage Crops.

Farming Remote from Markets.

By Mrs. C. S. PHELPS.

Old-Time Housewives and Their Houses.

Local History; its importance in attracting the child to general history.

Primitive Industries.

Some Floral Treasures of Connecticut.

CONNECTICUT AGRICULTURAL COLLEGE.**Prof. A. G. GULLEY.**

Arranging and Planting Home Grounds.

Why Apple Growing is not more profitable.

Prof. L. P. CHAMBERLAIN.

The Rock Problem.

Agriculture as an Art.

W. A. STOCKING, JR., Farm Superintendent.

Arrangement and Construction of Farm Buildings.

Sheep and Hogs in Connecticut.

The Crop Side of the Dairy Farm.

Farm Tools as a Source of Plant Food.

Prof. RUFUS W. STIMSON.

Culture and Agriculture.

Prof. N. S. MAYO.

Some Diseases of the Dairy Cow.

Wounds and their Treatment.

Soundness in Horses.

Germs and Germ Diseases of Animals.

The Kansas Cowboy.

The Farmer of the Future.

Prof. HENRY A. BALLOU.

The Farmer and the Forest.

The Farm Woodlot.

Prof. C. L. BEACH, Dairy Instructor.

The Dairy Form or Type.

The Individuality of the Cow.

The Dairy School.

Importance of Animal Industry in Agriculture.

Prof. H. S. PATTERSON, Instructor in Mechanics.

The Relation of the Mechanic Arts to Agriculture and
Commerce, and the Importance of all to the Prosperity
of a Nation.

The Origin and Development of the Arts and Sciences,
particularly as applied to Architecture and Sculpture.
Illustrated.

Six Thousand Miles through the Dominion of Canada.

The Relation of Canada to the United States.

N. S. PLATT, New Haven.

Painstaking Fruitgrowers.

Large or small Agricultural Ventures in Connecticut.

Which shall it be?

F. H. STADTMUELLER, Elmwood.

The Cost of Production.

Rural Economics.

What is the Value of a Cow?

E. C. BIRGE, Southport.

Intensive Dairy Farming.
Home Manufacture of Farm Machinery.
The New England Farmer's Manure Heap.

H. G. MANCHESTER, West Winsted.

How to keep the boy on the Farm.
From Calf to Cow.
Plain, practical, profitable Cow Feeding.
Common-sense Dairying.
Silos and Silage. Illustrated by models of various Silos.

THEO. A. STANLEY, New Britain.

Tile Draining. Does it Pay?
An Important Element on the Farm: the Hired Help.
The Use and Care of Tools on the Farm.

CHAS. P. AUGUR, Woodbridge.

Apple Culture for Connecticut.
Fruits and Flowers for the Farm.

The Audubon Society of Connecticut, through their President, Mrs. Mabel O. Wright of Fairfield, offer three lectures on Birds, fully illustrated by stereopticon. Early application, though desirable in all cases, is most important for all the illustrated lectures, as the slides may be engaged.

These lectures will be read with the stereopticon to illustrate.

1. FACTS ABOUT BIRDS THAT CONCERN THE FARMER.

Birds that protect the crops; also an account of the game birds to be seen in Connecticut during the year. Finely illustrated by seventy colored slides of birds of prey, insect-eating song birds, shore birds, and water fowls.

2. THE BIRDS ABOUT HOME.

An account of some familiar Connecticut birds, telling of their migrations, nesting habits, feeding methods, economic value, etc., and giving reasons, based upon sense, as well as sentiment, why they should be protected. Illustrated by seventy slides in colors. (Suitable for mixed audiences of old or young people.)

3. THE ADVENTURES OF A ROBIN.

A short story lecture for children under ten, illustrated by thirty colored slides.

N. B. Please send in all applications early, that there may be ample time for arranging and advertising. It is understood that individual lecturers, as well as the committee, hold the privilege of substitution when necessary.

COMMITTEE ON FARMERS' INSTITUTES.

CONNECTICUT BOARD OF AGRICULTURE.

T. S. GOLD, Secretary, West Cornwall.

EDMUND HALLADAY, Suffield.	N. G. WILLIAMS, Brooklyn.
FRED'K DOOLITTLE, Cheshire.	E. G. SEELEY, Roxbury.
JAMES F. BROWN, N. Stonington.	E. D. HAMMOND, Cromwell.
I. C. FANTON, Westport.	C. A. THOMPSON, Melrose.

CONNECTICUT EXPERIMENT STATION.

Dr. E. H. JENKINS, Director, New Haven.

STORRS EXPERIMENT STATION.

Prof. C. S. PHELPS, Vice-Director, Storrs.

FARMERS' CONVENTION AT NEW HAVEN.

The Annual Farmers' Convention was held at New Haven Dec. 11th, 12th, 13th, in accordance with the following Program. The attendance was good, and the interest fully maintained from the opening to the close.

The speakers filled the demand for instruction, pleasantly delivered. The topics were of present and of vital importance to every rural community, and the musical entertainment provided by our lady friends was so varied and of such choice selection as to fully warrant the meed of praise bestowed by an appreciative audience. We are sorry that we cannot put it in the report to lighten up the more substantial material, but without this embellishment this report is confidently offered to the citizens of Connecticut for their consideration, in the hope that its perusal will bring both pleasure and profit to compensate for their labor and ours.

The Connecticut Experiment Station and the Storrs Station exhibited samples in the several lines of investigation they are required to pursue, especially in the interests of pure food.

The Horticultural Department of the Agricultural College furnished some interesting specimens, and the Mechanical Department showed fine samples of work by the students in wood and iron.

The show of fruit was smaller than usual, and we do not like to have this feature of the winter meeting fall into neglect. Perhaps the collection of fruit for the Pan-American Exhibit at Buffalo may have been one reason why our own tables were neglected. The Pomologist, Mr. N. S. Platt, exhibited a

good collection of nuts for a barren year, for the Buffalo Exposition.

FARMERS' CONVENTION. — Program of the meeting of the Connecticut Board of Agriculture, at New Haven, December 11, 12, and 13, 1900.

Board of Agriculture. — (Organized 1866. Re-organized 1897.) Governor George E. Lounsbury, President; Edwin G. Seeley, Roxbury, Vice-President; T. S. Gold, West Cornwall, Secretary; Charles A. Thompson, Melrose, Treasurer; Dr. E. H. Jenkins, New Haven, Chemist; Dr. W. C. Sturgis, New Haven, Botanist; Prof. B. F. Koons, Storrs, Entomologist; N. S. Platt, New Haven, Pomologist; Fred. Doolittle, Seamen Mead, E. Judson Miner, Auditors.

Members: Gov. George E. Lounsbury, *ex officio*.

Members appointed by the Governor and Senate: Charles L. Tuttle, Hartford, Hartford Co.; James F. Brown, North Stonington, New London Co.; Chas. E. Chapman, Westbrook, Middlesex Co.; Iverson C. Fanton, Westport, Fairfield Co.

Members appointed by the General Assembly: Edmund Halladay, Suffield, Hartford Co.; Frederick Doolittle, Cheshire, New Haven Co.; E. Judson Miner, Bozrah, New London Co.; Seaman Mead, Greenwich, Fairfield Co.; Nathaniel G. Williams, Brooklyn, Windham Co.; Edwin G. Seeley, Roxbury, Litchfield Co.; Elbert D. Hammond, Cromwell, Middlesex Co.; Charles A. Thompson, Melrose, Tolland Co.

TUESDAY, DECEMBER 11.

10.30 A. M. PRAYER.

ADDRESS OF WELCOME, by the Mayor, Hon. Cornelius T. Driscoll.

INTRODUCTORY ADDRESS, by His Excellency, George E. Lounsbury.

11.30 A. M. ADDRESS — Higher Education, and the Welfare of the Country, Pres. Arthur T. Hadley, New Haven.

2.00 P. M. LECTURE — The Farm as a Home, Col. James Wood, Mt. Kisco, N. Y.

8.00 P. M. LECTURE — The study of Botany, Dr. W. C. Sturgis, New Haven.

WEDNESDAY, DECEMBER 12.

10.00 A. M. LECTURE — Some Modern Conclusions in Dairying, Hon. Wm. D. Hoard, Fort Atkinson, Wis.

2.00 P. M. LECTURE — Experimental Inquiry upon Milk Secretion,
Prof. Charles D. Woods, Orono, Me.

7.30 P. M. Question-box.

8.00 P. M. LECTURE — Lessons of 1899 and 1900 in Pomology, J. H.
Hale, South Glastonbury.

THURSDAY, DECEMBER 13.

10.00 A. M. Some Aspects of the Forestry Problem, Dr. J. F. Roth-
rock, Harrisburg, Pa.

2.00 P. M. What Constitutes a Dairy Farm, Hon. Wm. D. Hoard,
Fort Atkinson, Wis.

7.30 P. M. ADDRESS. — The Farmer in Public Life, Col. N. G. Os-
born, New Haven.

8.00 P. M. Reminiscences of Farm Life, Mrs. C. W. Pickett, New
Haven.

After each lecture there will be an opportunity for questions and discussion; all interested are invited to be present and engage in the discussions. The ladies are especially invited.

Music at intervals.

A Question-box will be provided to receive questions upon any agricultural topic to be presented to the Convention for answer or discussion at convenient intervals. *Get the questions in early.*

The Convention will meet in Republican Hall, 110 Temple St.

An exhibition of Fruits, Grains, Nuts, and other Farm Products, will be held under the charge of Mr. N. S. Platt, Pomologist of the Board. An opportunity for testing fruits and exchanging scions will be offered, and specimens and scions of choice varieties are solicited. Please make a worthy exhibit.

Fruit Growers are especially invited to contribute fruits carefully labeled, fruit photographs, lithographs, casts or models, implements used in culture, pruning, or gathering of fruits, new or improved packages for shipment, and cultivators generally, to bring or send collections of Corn and other agricultural products, Nuts, Syrup, Sugar, and Honey; Corn, three ears each variety, tied in a bundle; samples of Butter and Cheese, both Farm and Creamery, are especially solicited.

The Experiment Stations are expected to exhibit some of their work, and members of the Station Staff may be called upon to answer inquiries. Also exhibits from Connecticut Agricultural College will be explained by members of the Faculty who may be present.

All articles for exhibition may be sent by express, at the expense of the Board, to the Secretary at New Haven, to arrive on Monday, December 10th.

RAILROAD ARRANGEMENTS.

The N. Y., N. H. & Hartford Railroad will return, on certificate of the Secretary, at half-rates over all their lines, those attending and paying full fare by tickets or mileage. The certificates to be exchanged for tickets at New Haven station.

HOTEL ACCOMMODATIONS.

New Haven House (American Plan):

One person in room,	.	.	.	\$4.00 per day.
Two persons in room,	.	.	.	7.00 "
Rooms with bath,	.	.	.	1.00 " extra.

Hotel Garde (American Plan):

Upper floor,	.	.	.	\$2.00 per day.
Lower floor,	.	.	.	2.50 "
With private bath,	.	.	.	3.00 "

Meadow St., near the R. R. Station.

Tontine Hotel (European Plan):

Single rooms,	.	.	.	\$1.00 to \$3.00 per day.
Double rooms,	.	.	.	2.00 " 4.00 "

New Haven Green.

Hotel Davenport:

American plan,	.	.	.	\$2.00 and \$2.50 per day.
European plan,	.	.	.	.75 per day, and upwards.

Cor. Court and Orange Sts.

Gov. GEORGE E. LOUNSBURY,
EDWIN G. SEELEY,
T. S. GOLD, *Secretary*,
Committee of Arrangements.

WEST CORNWALL, Nov. 3, 1900.

REPORT OF THE PROCEEDINGS
OF THE
Farmers' Convention
CONNECTICUT STATE BOARD OF AGRICULTURE

At NEW HAVEN, CONN., December 11, 12, and 13, 1900.

MORNING SESSION.

NEW HAVEN, CONN., Dec. 11, 1900.

Convention called to order at 10.30 A. M., in Republican Hall, New Haven, by Secretary T. S. Gold.

Secretary GOLD. The Rev. William W. McLane of this city will open the convention with prayer.

Rev. McLANE. Let us unite in prayer. Almighty God, our Heavenly Father, we bow ourselves before Thee to do Thee reverence and to worship Thee. Thou art the Father and the Creator of the earth. Thou art the source of all power which operates in nature. We recognize thy greatness and Thy goodness in that Thou dost continually exercise Thy wisdom and Thy power for the benefit of us who are upon the earth. Thou makest the sun to rise and to shine. Thou sendest the rain which watereth the earth and Thou makest the earth to bring forth for the cattle and sustenance for the service of man. Thou providest for the wants of all living things. Thou art the author of the beauty of the flowers of the fields which delight our eyes and of the legions of golden sheaves which fill our barns with plenty, and the fair crops of autumn

which we gather into our storehouses. These are the marks of Thy kindness and of Thy goodness and of Thy care for Thy children, and we recognize and thank Thee for that goodness and care which Thou hast always exercised for us. We thank Thee for Thy bounty and for the blessings which Thou hast sent to satisfy the wants of Thy children here upon the earth. We thank Thee that Thou hast made us like unto Thyself and given us intelligence enabling us to take pattern after Thee and to become acquainted with Thee, and to know the forces by which Thou dost operate so that we may put ourselves in connection with them. We pray that Thy blessing may rest upon the intelligence and upon the labor of the farmers of the land. We rejoice that in these days of wide education, this great department of human industry is rising to a higher level, so that the wants of man are more fully satisfied than ever before, and yet Thou hast so arranged that the toil is lighter as the reward of the study of those who have discovered and unlocked the secrets of the laws of nature. This work has been of untold benefit to thousands of the children of men here upon the earth.

We pray that Thy blessing may rest upon this convention and that those who gather here may give one another such information and so inspire one another as to enlarge production to give additional prosperity, so that there may be no hunger that is not satisfied, and no want that is not supplied on the part of our people. And do Thou bless all such organizations and all institutions on these lines and all those who endeavor to fathom the secrets of nature for the use of mankind and those who endeavor to make themselves familiar with the works of God for the service of their fellow men.

Do Thou hear this, our prayer. Pardon our manifold sins and let thy wisdom be given unto all who shall speak at this gathering, and let this meeting be to Thy glory and to their profit. We ask these things in the name of the Lord Jesus to whom we ascribe all praise forever. Amen.

The SECRETARY. The next order upon the program is the address of welcome by the Mayor of New Haven, the Hon. Cornelius T. Driscoll.

Mayor DRISCOLL. In behalf of the people of New Haven, I tender you a most cordial welcome to our city. Although we are not an agricultural community, yet we feel a deep interest in your work; for we have close business relations with the agricultural districts around us. We buy our milk and vegetables and other farm products from the farmers, and they buy goods of different kinds in our stores. When the farmers around us are prosperous, we share in their prosperity through their increased trade in our stores.

The agricultural interests of the state have always been of the greatest importance and must necessarily continue to be so. A nearby farming district is desirable for every city, and, as the cities increase in number and population, the farms of Connecticut will be taxed more and more to supply the cities with the necessary farm products. As the population to be supplied increases, the productiveness of the land must be increased, so that one acre will produce what it took several acres to produce before. This can only be done by scientific fertilizing, and scientific farming in every respect. The work of the State Board of Agriculture is to teach the farmers how to get the largest and best crop possible from each acre of land. In doing this, you are benefiting not only the farmers, but also the residents of cities and all the people of the State; for as the crops become larger and more plentiful, dairy products more healthful, fruits more luscious and abundant, producer and consumer rejoice together in the blessings of the bounteous harvest.

But farms produce more than milk and poultry and vegetables. They also produce a sturdy, honest, and industrious set of young men, many of whom go to the cities and become active and honored members of every calling. There is no education more valuable, and no training that stamps itself

more indelibly on a boy's character than his life on a farm. School facilities may be limited, but he is taught one of the greatest of all lessons — to work for whatever he wishes to attain.

The program reminds me that I am simply to bid you welcome — that others are to follow — and that I must be brief. Perhaps I have digressed too much already in referring to farm products and farm boys. But I could not help it.

The most of my boyhood days were spent on a Connecticut farm, and whatever little success I have had in battling with the world I attribute in a great measure to the training received there. The farm will always remain dear to me; and the work which the State Board of Agriculture is doing to improve the condition of both farm and farmer, will always interest me.

Secretary GOLD. I can assure the Mayor we are very glad to hear his words of hearty welcome.

I take great pleasure in introducing to you his Excellency, the Governor of the State of Connecticut, Hon. George E. Lounsbury, a farmer known on the hills of Ridgefield in Fairfield County, where I am pretty well assured he gains strength and vigor for business by the labors he performs upon the farm. His success as a farmer is admitted as well as in other callings in life, and I take great pleasure in introducing to you our chief executive and one of the farmers of Connecticut, Hon. George E. Lounsbury.

Gov. LOUNSBURY. Mr. Chairman, ladies, and gentlemen: I think that I complained to you a year ago because in the long list of speakers I was the only one who had not been honored with an invitation to talk to you on some special subject. As I look at your program today, I see that I am put down for an "Introductory Address." I should be glad if it had fallen to my lot, as a member of this association, simply to introduce to this convention, one by one, its galaxy of speakers, for there would be no lack of knowledge to remind

you that everyone of your speakers, to whom you have given a subject, has won fame in that line of thought or of action which fits him to be master of his theme.

But if my colleagues have set me down for an address which would be in any real sense introductory to the speeches which are to follow, I have not that intuition which would fit me for the task. For instance, I do not know what conception of the "higher education" the distinguished president of our distinguished college may have, or whether he comes here to sound the praises of the farm or that the farm may swell the success of the college as it has been doing for the last two hundred years, in giving hosts of students to its classes and strength of brains to its professors.

And so I am compelled to choose my own subject. Only the child that is born to fame is named before its birth. I leave it for you to name my subject after I have got through, and I promise you not to complain if you feel constrained to give it a title as indefinite as was the birthplace of the old sailor who said that he "was born at Cape Cod, all along shore." (Laughter.)

As I was groping for a subject, a friend suggested that nothing would be expected from me here except congratulations, and I confess that it is a long speech which sums up all the beatitudes of the farm. (Applause.)

The other day I met one of your number — a good fellow who prays Sundays and croaks all the other days of the week — (laughter) and I asked him how he was getting along.

He said: "We farmers are not getting along at all. We simply exist." That man was happy in his birth and is happy in his life, who finds his joy, not so much in fame or wealth, or in what the world calls success, as he does in the simple fact of his own existence. (Applause.) And so, first of all and best of all and as a basis for all other felicitations I congratulate you on the fact that you exist, that from the Infinite came that one separate, special, individual spark of the Divine

which each one of you calls "I" and which we fondly hope will exist forever as "you" in finite and yet immortal form. (Applause.)

I trust that every one of you is glad and proud of the place of his birth. A while ago I walked with an old man and a young man over the somewhat rough and rocky farm of the latter, who was complaining because his ancestors, two or three generations before, had not gone west and bequeathed to him smooth and fertile fields. The old man listened for a while and then said: "John, no wise man ever complains of the place of his birth, and if your ancestors had gone west fifty or a hundred years ago, it is by no means certain that you would ever have been born at all." (Laughter.)

I congratulate you, too, on the fact, that your ancestors had the good sense to stay right here in New England, and that not only did you begin life with that best of all blood — New England blood — in your veins, but also that you grew up in the hallowed center of the world of letters, that through her school house you first looked out into the world of letters, that through her church you first gazed into the land of spirits, and that as you opened your mortal eyes, they caught the inspiration of her grand shores and of "her cloud capped granite hills." (Great Applause.)

But there are some of you who were not born in New England, and these I congratulate on that inherited or acquired wisdom which brought them to this good land. In the veins of their ancestors and of ours ran a kindred blood. They give sympathy and support to all our institutions. The state welcomes them to her privileges and her honors, and their children shall be the genuine sons and daughters of New England. (Applause.)

You are farmers, and I congratulate you on your calling. You are Connecticut farmers, and I congratulate you on your wisdom if you so view your surroundings, and so estimate

real success in life, as to count yourselves fortunate in your location.

Are there some of you who are still saying that Connecticut farming does not pay? We are going through a transition period, and no matter what may be the degree of prosperity to which we are tending, transition always costs until the old system has been thoroughly changed into the new. Our farms can never compete with the fertile prairies of the West in raising those crops which are not perishable, which have the world for a market, and which Western fields are fitted to produce. But a prosperity, greater than any which the palmiest days of Connecticut farming ever knew, is coming to those of you who study the possibilities of your farms, and who, with foresight and energy, prepare for those demands of the market which your farms can best supply.

No fact in the last census has for you a greater significance than this, that in the last ten years the center of population has moved toward the East. This means that no longer westward does agriculture direct the "course of empire," that the population and prosperity of the East are increasing and abiding, and that there will be a growing and profitable market for all the products which your Connecticut farms are fitted to raise.

I have time to speak of only one particular crop. You can buy wheat cheaper than you can raise it here, but in all the world there is no better apple than that which grows on a Connecticut tree, and if you give it culture and care, you can grow it on all your farms in abundance and beauty.

The present apple orchards of Connecticut will produce twice the fruit which they now produce if you will only give intelligent culture of the trees. You send apples to market when they are on the verge of decay. But the apples which you pick from your trees will bring you twice the money and three times the net profit if you will only give them that possible and comparatively inexpensive treatment, which will en-

able them to stand up through the hot days of October and the changing temperature of November.

I do not claim to be a pomologist, but I say in all assurance that apples which are fit to raise for a winter market at all, and which are sound when they are picked, can be treated at little expense so that they will keep sound for a December and a January market. And there will always be a remunerative winter market for all the first class apples which Connecticut farmers can ever raise.

You talk of the value of your farm, and say it is worth what it will fetch in dollars and cents, but it is a duty which you owe yourselves, to your children, and your calling, to place that value upon your farm which accords with its power to enable you to follow and accomplish the true and manly purpose of your life. Of course the farm must give you a livelihood. You are farmers to make money, but if you are living to make money your life is a failure whether you make it or not. For when the purpose is a mistake, the accomplishment of that purpose is not a success, it is failure.

The farm will not bring you great riches, but it will give you enough and to spare. It will not feed the fires of a restless ambition, but it will bring you contentment and peace. It will give you neither the power nor the annoyance of the large employer, but in your strong hands it is labor and capital combined, and it enables you to maintain a manly independence which, for human character, is better than all power. In your work on the farm there is no prejudice of man to mar your plan, no regard for law except the great and changeless laws of nature. And so I say again that it is a duty which you owe to yourselves, to your sons, and to your farm, to have a clear conception of life's mission. (Applause.)

I congratulate you on your calling, but it is not because your vocation brings you ease or luxury or large wealth. For ease is akin to death. Luxury is bitterness at the end and

large wealth is a danger to any man who counts it as anything more or better than a mere incident in his life.

We talk about the grand age in which we live. And it is a grand age in discovery and invention, in scientific research and achievement, in business enterprise and intellectual attainment, grand in everything except that one thing which sums up all real grandeur, the grand purpose of individual life. Here, man is sadly wanting. He loves pleasure, he counts money as its price, and so he lives to make money. He succeeds, and even in his success he tastes the bitterness of failure.

But you have come here as farmers, to give and to receive information in those matters which concern success on the farm, and you do not care to listen to-day to any moral essay on the purpose of life. And yet, if from this convention you carry to your homes increased love for your calling and heightened ambition for success in your work, and if you consecrate this love and this ambition on the altar of true life purpose, you will not only ennoble your own manhood, but you will dignify the farm as a vocation, a home, and a heritage.

Hundreds of Connecticut farms, the pride of a family for generations, have passed into the hands of strangers because their former owners taught, by choice or example, that doctrine which withers the soul, the doctrine that the chief end of man is to make money. Their ambitious children, quick to catch the spirit of this false purpose, left the farm to seek some road to larger wealth, which they never found. If man looks back from the beyond, many a once proud Connecticut farmer sees, as the result of his false purpose and his false teaching, his broad acres pressed by the feet of those whom he once despised, while his sons are hirelings in a strange land.

Music by Mrs. F. Howard Russell, and Mrs. Pauline Hickman, accompanist.

Secretary GOLD. At the request of our President, to whom

belongs the duty of presiding at this meeting, I will continue to have charge of this morning's session.

It gives me great pleasure on this occasion of our gathering here as the farmers of Connecticut under the walls of Yale University to introduce to you the President of Yale, Dr. Arthur T. Hadley. We will now listen to him.

Dr. HADLEY. Mr. Chairman and gentlemen: The Governor intimated a moment ago that my speech might be occupied, or might probably be occupied, with praises for the farm. I would arrange it in this way, and for several reasons. In the first place it seems to me that the work of the Connecticut farmer speaks for itself, and needs no praise. Second, if it did need praise that was rendered doubly unnecessary by the felicitous words of our Governor himself in his introduction. Third, I believe that the farmers of the State care not so much for praise as for opportunity; for a market for their produce, for protection of their interests, equal rights and protection under the law, and, finally, the best reason of all, I am to speak of education, because I conceive that you would prefer to hear a man speak about something of which he knows a little by experience, rather than to hear him speak on something which you all know a great deal more about than he does. My subject is on the relation which exists between higher education and the welfare of the country. It is a plain talk on certain facts that are before us.

THE RELATION BETWEEN HIGHER EDUCATION, AND THE WELFARE OF THE COUNTRY.

DR. ARTHUR T. HADLEY,

President Yale University.

In these days of progress and reform, when no institution is allowed to pass unchallenged, the higher educational system of the country must be prepared to prove its usefulness, if it would expect a continuance of public support. What does it do for the community? Is it worth what it costs? Which

parts are most valuable? These are questions which must be squarely faced, and satisfactorily answered.

I think that there are three distinct ways in which higher education helps the community, and by which it proves its right to exist. First, it makes our people better workers in their several occupations. Second, it makes them better members of the body politic. Third, it makes them better men morally and spiritually. And I also believe that those good results of higher education which are least obvious and least easily measured in dollars and cents are the very ones which have most fundamental importance to the nation as a whole.

How does education make a man a better worker in his profession? Partly by teaching him to do in the school or the laboratory things which he would afterwards be compelled to learn more slowly in practical life, whether on the farm, in the shop, or in the office. This is what is known as technical training. Partly by teaching him, in his school or college days, theoretical principles which, in the experience of practical life, he would not be likely to learn at all. This is the idea of scientific training. The distinction between the two ideals is a radical one. The former aims to save the time of the student, and to put him as quickly as possible into a position to do work and make money; the latter aims to increase the range of the student's conceptions, and to give him command of theories which will enable him to advance the methods of the business which he undertakes.

The advantages of purely technical training are so obvious that very few people are blind to them. In fact, those who object most to the cost and the results of higher education, as a whole, are the very ones who wish the amount of technical training to be increased. "What is education for," they say, "if not to make a boy a worker, and to save him the necessity of learning his trade after he leaves school?" In spite of this fact, however, the general tendency of education in this country has been to become less technical and more scientific—less occupied with exercise in details, and more with teaching of ideas. A hundred years ago the young man who desired to enter a profession prepared himself in the office of some lawyer or doctor, or in the study of some minister. There he learned the way in which things were done, — how to collect a note, to write a prescription, or to compose a sermon.

When professional schools were established in connection with our universities, in the early years of this century, they at first aimed to do on a large scale just what individuals had been doing on a small scale. They tried to give instruction in the particular things that needed to be accomplished. But as time went on, it was found that they could do more good to their pupils in other ways. Not by telling the student how to do particular things could he be made a good lawyer or doctor, but by teaching him those principles of legal interpretation and of scientific physiology which should enable him really to understand the cases that might arise, and to use the books which bore upon those cases. A similar development, though less marked, has taken place in many of our best schools of technology. No longer are they places for shop-work, but places for the training of thinkers; of men who may not know how to do particular things which will first be wanted of them, but who are in possession of that general knowledge which will enable them to learn more thoroughly the real bearings of any new problem as it arises. They have become less technical and more scientific.

The student who goes out of a school of the more modern type seems for the moment less well equipped than his rival, who has studied in an office or an old-fashioned school of the strictly technical character. He does not know the daily routine of the business. He cannot turn his hand and his tongue from one thing to another with the quickness which the technically educated man possesses. But as time goes on this disadvantage ceases; and soon the balance shows itself on the other side. For the man who has devoted his school life to the learning of details of office and shop work soon finds that he has a great many things to unlearn. No college can anticipate accurately the conditions of actual practice; and the man whose hand has been trained to meet one specific set of conditions is sometimes worse off than the man who has not been trained at all. Far better equipped is he whose education has been really scientific, and whose mind has been trained more than his hand. Has an important process been developed anywhere? His knowledge of books, if it is worth anything, will enable him to find it out as soon as possible, and to understand it as fully as possible from descriptions and suggestions. He will thus be in condition to make progress in

the line of work that he has chosen. His assurance of immediate attainment of a third-rate position may be less than that of the man who is educated only in technical details; but his chance of ultimate attainment of a first-rate position will be infinitely greater. This is no more theory; it is supported by the testimony of large employers in different parts of the country and different lines of industry.

But the chance of gain to the individual is not the only thing to be considered in estimating the relative value of scientific training, as compared with that which is purely technical. Its advantage to the nation as a whole is inestimably larger; for it is upon this higher scientific training that national progress is largely dependent. The man who has been educated to be a creature of routine generally clings to old methods; the man who understands fundamental principles can develop new methods. The gain to the nation in having its industry progressively directed and conducted is something which cannot be measured in dollars and cents. It is a primary condition of national efficiency. It is just because America enjoys pre-eminence in this respect that she holds her present place among the nations of the world.

But it will be a mistake to suppose that the professional skill which our people receive from the best scientific training constitutes the country's whole gain from scientific education, or even the major part of it.

A man is something more than a mere producer. He is a member of the body politic, living in constant and complex relations with his fellow men. The right adjustment of these relations between man and man is a more difficult and important thing than the development of technical skill. National education, if it is to be really national and not individual, must prepare the way for this adjustment. It must teach people not only to make the most of themselves, but to do the most for others. They must learn how to communicate their ideals so that others will understand them; to arrange their work so that others can enjoy its fruits; and to take part in the work of government so that the community as a whole shall be directed by political intelligence instead of political ignorance.

In order to ensure clearness of communication, our higher education must teach proper use of language. Without such power over the means of expression, a man's thoughts are of

no profit to any one but himself. He becomes a theorist in the bad sense of the word — a man whose ideas cannot be made to help others. It is just because of deficiency in precise expression that the term “theory” has been often brought into contempt. The Greek word from which “theory” is derived means “breadth of view.” In this sense the more we have of theory the better. But a man who makes his real or alleged breadth of view an excuse for his inability to tell other people about the details which they want to know becomes an intolerable nuisance. Nay, he may often become a self-deceived impostor; for the man who cannot put his thought into language which others will understand is generally not sure of understanding it himself.

In contributing to this clearness of communication, we have use alike for education in English, for education in other modern languages, and for education in the classics.

If we had to choose between the three, there is no question that English is the most important. It is the language in which our work is done. The man who is a master in its use possesses a power of control of those about him which can be obtained in no other way. He has an unrivaled command of synonyms which give exactness to his thought; for there is no language which is nearly so rich as English in words to designate the different subjects of modern interest. But this does not mean that it ought to be taught to the exclusion of everything else. Every one recognizes that we have so much need to use French and German, that no man can be called fully educated who fails to have some knowledge of both these languages. Our national problems may, perhaps, be solved by English alone; our international relations involve the knowledge of many other tongues besides.

The reason for the study of the classics is at first sight less obvious. The time spent upon them is so great, and their tangible usefulness seems so small, that many people regard the whole matter as a waste of labor. Such reformers would have our schoolboys read Homer or Cicero in translations, and would have the time for grammatical drill spent upon English sentences, instead of Greek or Latin. The chief difficulty with this plan is that we have at present so few teachers who are competent to give good instruction in English, except through the medium of Latin or Greek. Over and over again

have I heard men argue for the extension of English teaching in place of the classics, when the speakers showed by their diction, their grammar, and their rhetoric, that they had not the least conception of what good English expression really was. No man thinks that he can teach Latin without having studied it. His knowledge of Latin may be defective in a great many ways, but he at least knows his deficiencies. On the other hand, there are thousands of men in the country who have never thoroughly studied English, but who would be insulted at the suggestion that they did not know it well enough for all practical purposes, including those of instruction. The marvelous grammatical system of Latin or of Greek, coming to us in a foreign language, arrests our attention, and makes teachers and scholars feel that it is something to be seriously studied. When we have a body of teachers who are ready to teach English with equal seriousness, and are able to suppress that vastly greater body who handle it mechanically or carelessly, then — and not till then — shall we be able to talk of superseding the classics in our educational system. Under present conditions they remain vitally important to the welfare of the country as a means to accurate expression and clear thought in the communications between man and man.

Our students must learn not only to communicate their ideas to others' understanding, but to adapt their work to others' wants. They must know how to suit their products, whether material or intellectual, to the needs of those about them. A well arranged college course provides for this in two ways. It does something toward this end by the teaching of political economy, and sciences allied to it. By showing the places which different men hold in the business organism, it enables many of us to avoid misjudgments and mistakes which might render our best work futile. But there is an indirect way in which a college course contributes more surely toward the same result. By allowing the student the choice of serious studies in a wide range of subjects, it enables him to make experiments which help him to decide upon the line in which he is best-fitted to serve his fellow men. The man whom nature intended for a doctor, but whom fate has driven into a lawyer's office, does not find out his mistake until years of preliminary work have made it irrevocable. The farmer who is spoiled by trying to be a minister, and the minister who is spoiled by try-

ing to be a farmer, have each gone so far as to be in many respects unfitted for the career for which nature designed them. But if the student has, during the college course, studied physiology and constitutional law side by side, or has had the chance to make experiments alike in providing for men's bodies and in saving men's souls, he can see far more clearly where his talent lies, and can let the experience of a single year determine rightly what otherwise could only be decided too late for repentance.

DEMAND AS WELL AS SUPPLY. — BIOLOGY.

A college course, if properly directed, must also train its students in the obligations of citizenship. This function is more important in America than anywhere else. An American does not fulfill his whole duty if he is only a skillful specialist, or even if he is a good business man, and nothing more. He has a broader duty as part of a sovereign people. He must understand the constitution of the country and the spirit of its laws; not in that perfunctory way which is obtained by the acquisition of a few facts, but by a severe training in those principles of ethics and politics which are needed for the preservation of a free commonwealth. He must understand the indirect effects of legislation no less than its direct and obvious ones. He must be familiar with the political history of his own nation, and of other nations beside his own, in order that he may be a leader who will enable his fellow men to look beyond the passions and prejudices of the moment, and help them to see what is the probable bearing of the issues, as they arise, on the future welfare of the community.

Rightly to accomplish this, the college must give its students something more than mere training of the intellect. Much as intelligence is needed in the conduct of our business and our politics, we have learned that intelligence alone will not accomplish everything. The higher education will do little toward making more efficient citizens unless it makes at the same time broader and better men. It must so inspire those who come under its influence that they shall apply, in the conduct of the larger affairs of the community, those principles of morals which are recognized as obligatory upon us in our relation to our families and our neighbors.

All intelligent study of science, whether it be physics or biology, psychology or history, should train a man in that respect for law which is the best antidote to capricious self-will on the part of the individual. The student learns that he is in the midst of an ordered world. If he has the root of the matter in him, he thereby gains increasing respect for that order, and readiness to become himself a part of it. It was the idea of the best of the ancient philosophers that virtue consisted in placing one's self in harmony with the universe. To him whose idea of the universe is narrow, the conception of such harmony will be narrow also. The one broadens with the other. And if, with this enlightened study of natural and moral law, there is combined at the same time the restraint of a healthful discipline and an enforced regularity, the student becomes gradually fitted for that highest duty of citizenship, the acceptance of self-imposed burdens in the interest of a general system of moral government.

But this is not all. The duties that are a burden, however cheerfully performed, do not represent our fullest character development; nor is the man who does his work in that spirit the most efficient contributor to his country's moral welfare. Far better is it if the performance of civic duty can be the result of an inspiration which makes it a joy, and not a task. The teacher who is fitted for his work has the opportunity to impart this inspiration through the study of great works of literature, and great deeds of history. There may be other ways in which the teacher's contribution to the well-being of the community is more direct and obvious; but there is, I think, no way in which he can really do so much toward bringing out what is best in a nation. The boy or man who, at the most impressionable period of his life, lives in company with heroes, whether of history or of fiction, has every chance to realize his own possibilities of heroic devotion. Of course this privilege, like every other, can be abused. There will be some who will become dreamers instead of heroes — who will take the enjoyment furnished by the past, and give nothing in return. But, fortunately, the atmosphere in our better colleges is not favorable to the dreamer. It offers a strong stimulus to work. This work may not always be directed on the lines which teachers, or even parents, would most approve. It may manifest itself on the foot-ball team or on the river with far more

spontaneity than in the class-room; but as long as those who seek their glory in athletic sports are subjected to rigid training rules, we need have little fear that the power directed into these channels will prove a total loss. That a university, as to-day constituted, gives opportunities for waste of time, none can deny; but, that such waste is habitual I believe no one who has studied the facts would be disposed for a moment to admit. If what has been said in this paper is true, those very parts of our collegiate education which are less immediately practical, and which seem to give the most opportunity for misdirected energy, are the ones which have their highest usefulness in the preparation for the citizenship of the commonwealth.

Mr. R. S. HINMAN. Mr. Chairman: I want to introduce a resolution at this early stage of our proceedings, because there seems to be need of it. Almost every farmer in Connecticut knows that there is pending before Congress a bill known as the Grout Bill. When we see a picture of our Uncle Sam with his tall hat and long tail coat, we think he can do about everything. Well, he can do about everything, and there is one thing in particular which he can do, and that is, he can lay taxes. The Grout Bill lays a tax upon oleomargarine, that puts it where the retail dealer in selling it — if he sells it as butter — must charge about the price of butter, and he must pay about the difference between what it costs him, and what the consumer pays to the United States Government. We have got to have revenue, and it is about as nice a way as we can get it.

Resolved: That we, the farmers of Connecticut, in convention assembled, desire to express our sincere appreciation to the loyal support given to the Grout Bill by the representatives of this state in the House of Representatives at Washington, and we most earnestly request Senators Hawley and Platt to use their utmost endeavors to secure the passage of the bill without amendment through the United States Senate.

I don't think there is any farmer here or any man who consumes butter but what wants to buy butter when he pays for it, and this bill is in the line of helping him to do it.

Vice-President SEELEY. I second the passage of this resolution. I wasn't aware that it was coming up here at this time, but after coming in close contact with some of my brother farmers and milk dealers, milk producers, etc., in the State of New York, I know what an amount of energy they have been bringing to bear on this matter in Congress. There are some points that are well for us to consider. You know they have tried to cut off, to destroy, and forbid the manufacture of oleomargarine, but it is a serious question whether it can be done. It is a question in my mind whether if it can be done at all it can be done constitutionally according to the laws of our country, and for this reason: take any article of different ingredients, the compounding of them or putting them together in a strictly legitimate business and the manufacture of something that is not a nuisance or deleterious to health or the happiness of the people is something it is very difficult to interfere with. It is a question whether we have any right to place ourselves against it. There is no question, however, in regard to the taxation of something that we know is a detriment to our interests and which we know comes into competition with our good butter, or something which is genuine. Therefore, I feel, after considering this matter for years in connection with the milk industry of this country, that it is questionable whether we can ever forbid the manufacture of this article, but we can tax it so that there will be no incentive or object to give it a false name, and therefore I hope that this resolution will pass unanimously.

Ex.-Gov. HOARD. Mr. Chairman: Permit me to say a word at just this juncture. We live under a federal government of limited power. The federal government has no power to prohibit it, has no police power. We have no national police and the constitution fixes or gives our national government

no right to impose upon the country a prohibitory law concerning anything. Consequently if the federal government desires to secure the retrenchment or abatement of any fraud or counterfeit it has to do so under the limitation of the federal constitution. The federal constitution gives to the government the right of unlimited taxation. The decision of John Marshall of the Supreme Court of the United States and other decisions of that great court since the organization of the government have been clear upon that question, to wit: that the constitution imposes no restriction in point of taxation upon the federal government. That power has been effective. The federal government taxed the State banks out of existence for the purpose of preventing loss and fraud and disappointment to the people and for the purpose of establishing a sound and universal system of currency. The federal government taxed filled cheese on the same ground for the purpose of repressing the manufacture and sale of a fraud. The federal government has imposed a heavy tax per barrel upon adulterated flour. This Grout bill is in the same direction. As president of the National Dairy Union I have had this question in charge, and that body also has the question of carrying through the tax on filled cheese. We have won a part of our victory. We secured a majority in the House of Representatives the other day of 106 for the Grout bill. This fine result is the crowning of the labors of the Dairy Union to accomplish their great purpose. The National Dairy Union raised \$14,000 among the lovers of honest trade and that money has been expended, every dollar of it, in arousing the constituency behind every member of Congress. It takes a tremendous power to move Congress, and it takes a tremendous more power to move the people. We have a fair prospect if the members in the Senate see this question in its proper light, or are made to see it, of passing the bill in the Senate and of its becoming a law.

It contains two sections. The first section places the tariff

on oleomargarine under the control of every State in the Union. I take it, it is there now under a decision of the Supreme Court, but a decision of the Supreme Court is liable to be reversed, and we desire a law of the country fixing its status.

The second section imposes a tax of ten cents per pound upon this product when made in imitation, or when colored or made in imitation of butter. It imposes a tax of only one-quarter of a cent per pound on oleomargarine when made and sold in its own dress and its own color. This bill simply says to a fraud and counterfeit, if you put yourself in the guise of honest products this federal government will impose just as severe a burden upon you as its constitutional power will permit.

Now, gentlemen, the State of Connecticut is a force in the Senate, and I want you to so vote, and what is more I ask you to write, every man of you, I wish every man of you would constitute himself a committee of one and write to your senators in favor of the passage of this bill. Your representatives have done nobly. Representative Henry was a host in the fight, and took the leadership and burden of it very largely. I believe that this is a righteous measure and one conceived in righteousness and executed in righteousness. It is a wholesome thing and a cheering thing to meet in all this wide waste of profligacy, which is so general all over the country, Congress suddenly brought up to a realizing sense of what they ought to do in this matter in behalf of a righteous claim because the people say so.

Secretary GOLD. Those who are in favor of the passage of this resolution will signify by saying "aye," contrary minds "no."

The resolution is unanimously passed.

Mr. HINMAN. Mr. Chairman: I have got one more resolution.

Resolved: That the Secretary of the State Board of Agri-

culture be requested to immediately telegraph this resolution which we have just adopted to the senior senator of Connecticut, Hon. O. H. Platt.

Secretary GOLD. Gentlemen, you hear the resolution offered by Mr. Hinman. It has been seconded, will you pass it? All those in favor say "aye." Contrary minds "no."

The resolution was passed.

Secretary GOLD. Friends, when we have met in these annual conventions we have often missed from time to time some of those who have before met with us, and it becomes meet and proper upon our assembling at this time in annual convention to remember a friend who has passed away during this last year: one who was so long with us in our work and who took a great interest in the agriculture of Connecticut. I beg your pardon for calling your attention for a few minutes to a brief sketch of our old friend and associate, Hon. James A. Bill.

HON. JAMES A. BILL.

"JAMES A. BILL was born in Lyme, March 30, 1817. He was the son of Lodowick Bill and Betsey Geer. He died of heart disease February 1, 1900, at Bill Hill, Lyme, near where he was born, and where he had always made his home. His wife, Ann Lord, of Lyme, whom he married in 1839, survives him with three sons and two daughters. The sons, Lodowick and Kansas N., live in Lyme, the latter on the farm. James A. resides in Springfield, Mass. The daughters are Mrs. J. L. Martin of Springfield and Mrs. Lyman Chapman of Lyme.

"Mr. Bill had no opportunities for education except those of the district school. At the age of twenty he started out as a book agent, traveling through the Western States for five years. He was so successful in this enterprise that in 1842 he established a book publishing business in Philadelphia, which was a decided success, but this was relinquished in 1860, and he then devoted all his energies to the improvement of his farm and to the breeding of choice stock. Devons were his

favorites, and he was a frequent exhibitor at cattle shows, where his line of thoroughbred Devons and working oxen and steers mostly of his own breeding, were much admired.

“He made his farm a model of neatness, thoroughness, and productiveness. High fertilization, skillful culture and large crops were the rule. He was a friend to the laboring man, regarding it as a duty to furnish employment to every honest worker at fair wages, yet he had no place for the idler and time-server. With such he might be called exacting, but his fairness and integrity in all his dealings with his laborers, in sales of stock, and in purchase of wool, in which he was a leading dealer for many years in Connecticut and Long Island, made a host of friends, and for proof we have only to recall his business success. He also imported large quantities of Canada ashes as a fertilizer for his own use and for sale, and the fields to which these were applied attest their value.

“Mr. Bill was much interested in sheep culture and was one of the largest flock masters in the State. Here we make a criticism on his work. He kept a large number of breeds, so that he could not do full justice to any of them. Merino and Saxony, the Downs, and the Angora sheep or goat all had their merits, all were his friends, and it was impossible for one man to excel in developing breeds so diverse, yet having so many wants in common. The most successful breeders have confined themselves to one breed and striven to produce perfection according to their chosen model. With all his outside duties his farm, his flocks, and herds were never neglected.

“For seventeen years, from 1879 to 1895, he was a member of this board, and by his attention to duty and wise counsel added much to its efficiency. He was president of the New London County Agricultural Society almost continuously from its organization in 1845, and its success was largely due to his skillful management. He was president of the Connec-

ticut State Agricultural Society for sixteen years, and earnestly performed the duties of his office.

" Mr. Bill was appointed as a member of the State Fish Commission in 1867, and by reappointment continued to hold this office except one intervening term till his death. He was much interested in this work and rendered valuable service in framing and executing plans for the propagation of shad and other fish.

" In politics Mr. Bill was a staunch Democrat, but he was so honest and persistent in his opinions that his political opponents always treated him with respect. He twice represented Lyme in the general assembly, and in 1852 and 1853 represented his district as senator.

" Mr. Bill was richly endowed by nature, physically and mentally. He understood human nature. This, united with his known integrity and activity of mind and body, enabled him to perform all his varied duties without neglect of any.

" Mr. Bill made friends in all his business relations, and in his death the State loses a faithful and devoted servant."

Mr. Seeley, our Vice-President, will preside at the exercises this afternoon.

Convention adjourned until 2 o'clock.

AFTERNOON SESSION.

Tuesday, December 11, 1900.

Convention called to order at 2 P. M. Vice-President Edwin G. Seeley in the chair.

The PRESIDENT. If you will please come to order now, gentlemen, we will have the question-box opened for a few minutes and then we will have something better. The secretary will please open the box and let us know what it contains.

Secretary GOLD. I have opened it, and although I requested that this box be filled up in good season I find here a question-box with a lot of blank papers to be filled, and I propose to take these few moments in talking to you about the question-box. I want to tell you what you can do as visitors at this farmers' convention. You have the privilege of bringing up any subject upon any agricultural or rural topic that will interest you, and we have tried on our part to provide speakers who are as well qualified as they can be to wrestle with these questions which you ask. We don't promise to answer every question that is put in the box, no man is able to answer all that can be asked or tell you all that you would like to know, but men are here who are eminently qualified to answer those questions, and it is the desire of the Board that you should avail yourself of this opportunity, so that on another occasion when the box is opened it may not be found so void of material.

Mr. HOYT. Mr. Chairman: If there is no question in the box I will send one up.

Secretary reads: "Meat smoked in two hours if placed in our liquid extract of smoke made from hickory wood. It gives a delicious flavor and is cheaper and avoids the nuisance of a smokehouse. Send for circulars."

Mr. HOYT. I would like to ask if any gentleman here has had any experience in that line. If so, I wish he would tell us about it.

Sec. GOLD. When I was a boy, Deacon Norton of Goshen had a large iron boiler in which he placed wood which he burned and converted into charcoal, and the issuing gas was condensed, forming pyroligneous acid, having a very strong odor of smoke. It was recommended as a preserver of meat, and it was thus used all about Litchfield County, in the neighborhood where it was manufactured. It saved a good deal of labor and trouble and served the purpose very well, with the exception that you did not have the drying result which is

one of the elements in the preservation of meat and which is attained by the ordinary smokehouse. This preparation of Deacon Norton's was quite popular for a time, but the business was afterwards given up.

Mr. HOYT. I have seen that advertised a long time and I should like to know whether there is anything in it, because according to that, all you have got to do is to cure your hams with the preparation and you get rid of all the bother of a smokehouse. If it will answer the purpose it is certainly a great thing. I would like to know if there is anybody else here to-day that has had any experience in that line.

Sec. GOLD. Prof. Benjamin Silliman, in his Chemistry published in 1831, describes the process of manufacture of this article and recommends it for curing hams. Under the name of "wood vinegar" it is largely used in the arts, as in making white lead. So its use in preserving meat is no new discovery, but it has not stood the test and has been discarded.

Sec. GOLD reads: "What is the effect of pumpkins fed to milch cows; beneficial or otherwise?"

The PRESIDENT. Beneficial.

Sec. GOLD. There have been a great many articles in the papers stating that you must carefully remove the seeds before you feed pumpkins to cows, owing to the effect of the pumpkin seed which has a tendency to reduce the supply of milk. Now I wasn't brought up under any such idea. I was brought up to believe that a liberal supply of pumpkins was one of the best foods to keep up the supply of milk and cream in the dairy during the failure of the autumn pasture. This year I have had some experience in this line. I fed my cows pumpkins for over a month this last fall and I was very well satisfied with the result. I found it a very advantageous way to supplement the pasture at just the point in the fall when it was failing on account of dryness. We were sending milk to the creamery, where the quality of the milk was of more importance than the quantity, but the milk, instead of growing less and less,

showed a gradual increase, and it was of an excellent quality. We did not remove the seeds. We didn't think we could afford to do that. I have found when the pumpkins have been fed near the barn and the ground became covered with the seed, that some of the poultry and young fowls were crippled in their feet and legs by feeding upon the seed. On that account we have had to remove the feeding ground of the pumpkins to our cows far enough away from the barn where the poultry run, so that they will not eat the seeds, and we have had no trouble from the seeds since then.

Mr. HOYT. How do you raise them?

Sec. GOLD. The supply that I had this fall was raised in a young orchard. It was put in as a supplementary crop to keep the weeds down and was subject to only partial cultivation through the season, but they grew finely, and we shall continue to raise them as opportunity offers.

Mr. HUNT. Mr. Chairman: My experience is that the pumpkin seeds taken out increase the value of the pumpkin for food. My experience is that it pays to take the seed out. The great objection to it is the time occupied in taking them out, but if you have got any one in the family to attend to it I think it is better to do it.

Sec. GOLD. "What does smoking do to meat?" That comes in in connection with the first subject that Mr. Hoyt brought up. Smoke is an antiseptic. It is something that prevents fermentation and decay, and you cannot have any more powerful antiseptic than smoke. That is one reason why the old houses with their smoky chimneys were so healthful to the people. So with wood choppers that go into the woods, live in cabins, and make charcoal. They live in smoke and inhale the dust of the charcoal. Perhaps that is deleterious to some extent, but their houses are filled with smoke from their open fireplaces, and yet they are the healthiest people in the world. It is considered a disinfectant of the highest quality.

It is also one of those articles, the use of which when carried to an excess is injurious. Anything that prevents fermentation, decay, or decomposition of foods affects the digestibility of the article. Most of these antiseptics used for preserving food are injurious, preventing the digestive action of the stomach in just the degree that they preserve the article against decomposition. Hence, carried to an excess smoke would not be of any benefit to food. When properly used, of course, it is a very useful preservative of meat against decay.

I am sorry to be obliged to announce that our Governor has been called away to Washington, D. C. He expects to return before the close of the convention.

THE PRESIDENT. As our Governor has been called away it gives me pleasure to announce a gentleman who has appeared before this board repeatedly at our annual conventions. We have always listened to him with a great deal of pleasure. He is to speak to us this afternoon on "The farm as a home, or home life on the farm," any way as he sees fit to put it. I have the pleasure of introducing to this audience, Col. James Wood of Mount Kisco, N. Y. He will speak to you upon this subject.

THE FARM AS A HOME.

HON. JAMES WOOD, Mount Kisco, N. Y.

Mr Chairman, ladies, and gentlemen: When your respected secretary invited me to meet with you at this annual gathering and to speak to you, he named a subject on which he said he would like me to talk. He could not have named one more agreeable to myself, however agreeable it may prove to be to you.

Now, first of all, let us clear the ground and discover what we want to discuss. The subject is "The farm as a home." Now we all know that there are farms and farms. William Jennings Bryan said a great many things exceedingly well, and among them he said there was a difference between an agriculturist and a farmer. He said that an agriculturist was

a man who made his money in the town and spent it on the farm, and that the farmer was a man who made his money on the farm and spent it in the town. Now the agriculturist, according to his definition, is a gentleman who has an income from other sources than the farm, and who makes the farm his home, where he spends all, or a portion of the income derived from such other sources. In other words, it represents the country home of what we call a gentleman. Of course, that use of the word "gentleman" is rather restrictive and not necessary by any means, because some of the first gentlemen you and I have known are gentlemen without an income, but that is the exception. Now let us discuss for a moment such a home. I suppose every one will concede it is one of the most delightful places in the world where you have a well-equipped country home and country life supplemented by all the advantages which wealth can give, certainly an ideal existence. But such a home is restricted to comparatively few, probably three-quarters of the intelligent portion of mankind have no such home. I don't suppose, however, it is a part of our subject to-day to discuss such a home. Our subject does not contemplate the consideration of what wealth may accomplish in the country. Of course such a home brings about everything that conduces to enjoyment or that can be obtained by such means to the people of the earth who have given the most attention to such country homes.

The people who still love country life most of any people in the world are the English. This is true, because for four or five centuries they have been accumulating wealth surpassing the accumulation of any other country, and they have made country life a study. It has become an art with them. It has been developed to a higher state of perfection with them than in any other country in the world, so that very wealthy people in this country imitate the English as to their custom of living in the country. The people of the continent of Europe imitate the English country home. The English aristocracy, or the people of wealth, universally recognize that the only real home is the home in the country. Their London houses, or city houses, are only places of convenience for a short portion of the year. They do not do there as our wealthy people do here, that is, spend the most of the year in the city house.

They go to their city houses in January and they stay there for a short time occasionally in the winter, but for the greater part of the year their residence is on their country estates. In England the social season in London begins in January, and they go up for a short time for the fashionable season, but as a usual thing the English gentleman delights in his country home, and he generally so manages his affairs so that he spends the greater portion of the year in that habitation. I don't, however, suppose that this is properly a portion of our subject to consider what wealth may accomplish in country places, but it is rather to consider the farm as the place of business of the family, the farm from which the livelihood is obtained, and in that light to consider it in its home relation.

Let us consider then the practical farm, the real farm, the business farm as a home. Now then, having decided that that belongs to our subject, and that this is a limited part of it, let us next consider what the home should be. The corner stone of American civilization is the family; the family is the unit of authority. The family is the basis upon which everything must be built. Therefore, the public good demands that the family should be encouraged in every way possible, because there are influences exerted in the family that develop men and women as they cannot be developed in any other way. In those countries where family ties are strong, as fortunately is the case in our own land, the state has always been benefited by that fact.

In those countries where they have attempted by some artificial division to form institutions that would take the place of the family in the development of character and in the building of men and women, they have wholly failed to find any substitute for this work of the family. The family with its organization, the family with the influences surrounding it, develops that which is best in the boys and in the girls. The family influence is one of the strongest factors in building up character, and nothing else can do it, to fit our boys and girls, not only to be of use to themselves, but to be a benefit to society and to help the state. So the family to be a family as we understand it must have what we call a home. There are some languages in which there is no word for home. The French have no word that is equivalent to our word "home."

There are some races that have no place about which associations cluster as they do about our ideal home in America. The fundamental idea of home is that it is a place where the family reside. There may be, however, a family without a home. Possibly you know some such. I recently knew of a family that was in such a situation. They spent the winter in Florida or Southern California, and in the spring they came north and flitted from place to place without a permanent abiding place. It followed as a matter of course that the children of such a family, reared amid such influences, cannot have any abiding affection for any particular place which they call home. It is not a true family, and I am glad to say that such families are the exception rather than the rule. I speak of this because most of you know families of that character. Children should grow up into helpful, strong men and women and develop characters that will make them useful to themselves, to the state, and to society, but it cannot be done in such a family, because the fundamental principles that tend to build up children into strong men and women are there lacking. The most distressing consequences always result. So then we will understand the home to be the place where the family reside, not necessarily all the year, but the place which is entitled to be called the permanent place of residence of the family. It is not necessary, of course, that the family should remain there constantly, because I think it is good for every one to seek change sometimes, and the home is never so attractive, the home is never so lovely as when we have been away from it for a time and return after having seen other portions of the world, visiting other localities, and then return to the place where we reside. I believe that such a course tends to build up a feeling of attachment and of sentiment toward the home that is very desirable. In such cases we find a combination of conditions that give us rest and peace and contentment, and we say this is indeed a home.

Now then, if we are to consider the farm as a home, we have got to go into it in detail in order to understand it. We must go into some fundamental examination and consider first what is a man or woman. We must realize that we are all of us a trinity in himself or herself. Each one of us is made up of three parts — a body, a mind, and a spirit, or soul. Now the perfect man or woman whose body is helpful and

whose mind is active has a well developed soul. That is, a sound mind in a sound body and whose spiritual nature is also developed. Unfortunately, however, we find too many with good bodies, with sound, well developed and cultivated minds, and yet lacking in spiritual faculties. The spiritual nature has never been developed, and in such cases such people come far short of the full measure and full stature of men and women in the world. All three of these parts must be developed, and they must be developed in harmony with each other. They must be developed in right proportion and in the proper relations in order to make a perfect man or woman that will accomplish the greatest good in the world and be of the greatest good to himself or herself and to humanity.

Now, how does the farm compare with any other place of residence for a family in these three particulars? I ask this question, because this is really all there is to it. That is all there is to life. That is all there is to our being here. That is all our existence requires — the proper development of mind and body and soul. In considering this question, it seems to me that it is perfectly fair to treat it by comparison. There is no other way, and we must compare it with city life. Not with village life, for village life is simply a half-way station between the farm and the city. The village is an intermediate place along the line varying according to the character of the village. It is a sort of intermediate station along the line from the country home to the city. Life in some villages is practically almost the same as living upon a farm, and so it goes along by degrees until the village becomes a town and the town becomes a city, and passes through all sorts of varying degrees between those two extremes. It is not worth while for us to stop to consider life in this intermediate station, because delightful as many of these situations are they are not really a part of our subject.

We are therefore forced to consider the farm as a home in comparison with and in contrast to the city as a home. I do not know of any way by which this can be considered better or more effectively than by discussing the old question that you have heard so often, and that question is this: Why is it that the successful merchants and business men of our great cities were boys from the country? Statistics show this to be the case. I suppose no one will now dispute the fact, because

statistics have demonstrated it over and over again until the question is practically settled. It is no longer an open question. The successful business men of our country — and we may say the successful business men of the Anglo-Saxon race all around the world as a rule — were boys reared upon the farm. Of course, there are exceptions. Of course, there have been conspicuous exceptions, but statistics prove the position practically beyond question. Now, why is it? While seeking a reason for this it is hardly necessary to stop and discuss the question of physical development or comparative advantages for physical development, that is, for making a sound, strong body, between the country and the city. I do not suppose that you can find any one anywhere now who would say that a child that grows up in the country will not make a stronger boy or girl and have a stronger body and better developed body in every way than a child who grows up in the city. The country child has purer air, plays in the open air, takes more exercise from the time that it begins to play until it is able to go to work. The country child takes more exercise in better air than the city child ever does and certainly therefore ought to have a more healthful body on that account. But that is not all, the country child may have more healthful food. In most cases I think it is true that it does have, but unfortunately in time past there has been a very great lack in some of our country homes in this respect. I hold that the day is gone and gone forever for a narrow menu, a limited variety upon the farmers' tables. When nature gives such magnificent opportunities for variety of the most healthful food, it seems to me there can be no excuse why our farmers should not have the very best. So with all the conditions that go to build up the body and give more bone and sinew, give better bone, that is, more of the lime and cartilage portion, a bone that is fine in texture, fine and strong in every way. Boys that are bred in the country have such bone. They are endowed on account of this country life with a strong physical system that stands them in good stead to the end of their days. They have bones that don't break so easily, bones that when broken knit more quickly. Surgeons tell us that the country child has these advantages, and in everything that goes to develop the physical body, it is certainly true that the country child has an immense ad-

vantage. It is not necessary to stop to consider this, because it goes without saying.

Now let us come to this question of the relative advantages of the city and the country for developing the perfect man or perfect woman in all particulars, and we might almost say further before continuing the details of this, that when we speak of a farm we do, as a matter of course, pre-suppose intelligence. In these days of common schools, of graded schools, and of high schools in our villages and in our cities, ignorance has become almost a crime, and we cannot suppose that ignorance will be found upon the farm, because of the opportunities that are provided for something better. An ignorant man upon the farm is now the exception, where comparatively a few years ago he was the rule. Now then we come to this question, why does the country boy succeed in business, in the contest of life, where the city boy fails? Why is it? You have always heard this question asked, possibly you have stopped to consider what the answer is. Now let us examine for a moment how the city boy lives. Well, he lives in a house that is simply one little piece of a block of houses. It is like a brick raised upon its edge. He only has two ends of his house exposed to the air, it is shut in on both sides. But that house is provided with all that we call modern conveniences. It has every convenience for comfort. Even now it has the heat brought in from some common source which is supplied from outside of the house, and when the heat is needed the slide, or whatever it is, is simply turned on or off, as the necessities of the house may require. Or if that is not the case the furnace is in the cellar and is attended to by some servant, and is run as the convenience of the family may dictate. Light is furnished so that when an illumination of the rooms is required it is only necessary to strike a match, or perhaps simply turn a switch button and the electric light flashes up and the thing is done. The food is brought to the house without any effort on the part of the boy. The probabilities are that the milkman and the baker and the butcher come to the house in the morning before the boy is out of bed, and he goes down to the table and eats his breakfast, ignorant of the fact, so far as any necessity of the situation requires, but what there is some sort of a machine in the kitchen which turns these things all out to his hand. He

simply knows that everything is brought to the house and the cook prepares it and sets it before him. He eats his breakfast and then he goes out upon an errand or to school. What does he do? He walks out of the house and goes to the corner and gets into a street car and pays the conductor five cents. He never stops to think where that five cents comes from. He says, why of course we pay for our ride five cents. He goes to school, or he goes wherever he is going, and when he gets through what he has to do, or whatever his business may be, he gets into the street car again, pays another five cents and goes back to the house. Everything is provided to his hand. There is nothing for him to do but simply to live in a certain groove or way in which everything is provided. In the evening perhaps the family goes to some place of entertainment where the evening hours are whiled away pleasantly, and perhaps instructively, and so he passes the time until it comes time to go to bed, with everything in the way of convenience provided. In the morning he gets up, and the general routine begins again. Now, I believe I have stated correctly the life of the average city boy.

Now let us see what the country boy has got to do. He is called up in the morning, and I am now talking about the business farmer, and the life of a country boy upon a business farm. I want to say that I was raised on a business farm, and I know all about it. The average country boy upon a business farm is called up in the morning to go and bring in the cows, and, perhaps, he goes barefooted, and the cows are lying down in the pasture, and it is the fall of the year when the weather commences to be cold. And while the cows are coming together to go to the barn to be milked, he stands in the warm place where some old cow has been lying to keep his feet warm, and then he sends out to the cows shouts of "come, boss, come, boss," and lets down the bars, and the cows all come except one. There is one old brindle that stays off by herself in the corner, and don't pay any attention to him or the rest of mankind, or the world at large. The other cows are going along, and are going to get into mischief before they get to the milking yard, but the old brindle over there in the corner does not move. What is he going to do? Why, one of the very best things for that boy happens; he has a problem to solve, he has to use his reason. It is a problem that

has to be solved quickly, and he is thrown absolutely upon his own resources because he is the only one to solve it. He must look to himself alone, and to no one else for help. His faculties are put to the test to get that old laggard down there before the others get into mischief. And if they get into mischief he has got to get them out in the quickest time. So, in fact, there are other problems which have to be attended to even in this simple operation to bring the cows home in the morning, and then these cows have to be milked, and, perhaps, the cows have to be fed, and at different seasons of the year they must be fed different foods. These cows have to be milked, and the boy knows perfectly well that it is necessary for the milking utensils and the utensils used in the dairy to be scrupulously clean, because of the effect that any other condition will have upon the milk. There is a problem for him to solve. Furthermore, he cannot know the necessity of this without — if he is an intelligent person — inquiring the cause, and there opens up before him a field for thought and study and investigation that will go on with increasing interest as knowledge increases, and be of lasting benefit all his life long.

Perhaps he has to go to the wood pile and chop some wood to take in for the breakfast to be cooked by, and then there are half a dozen other things he has got to do before he goes in and eats his breakfast. He is not like the city boy, who goes into a dining-room and finds everything prepared for him, but in the average country farm home there too in the kitchen are difficulties to surmount. But that is not a part of my subject. This farmer's boy is surmounting obstacles from the time he is out of bed in the morning, and what he does while going after the cows and bringing them to the barn and chopping wood, is simply a sample of the obstacles that he is overcoming all the day long. In the morning he has had half a dozen problems to solve. It has had its unconscious effect upon his nature. It is teaching him to be self-reliant. When he comes to the house and gets his breakfast, perhaps after he has finished, he has to take the milk to the creamery, and he has to go to the pasture and catch the old horse with which to take this milk to the creamery. Now, when he goes to the pasture to catch the old horse, perhaps he will come to him, or, perhaps, unfortunately, the horse prefers to stay in the pasture, and does not care to be caught. There is an-

other problem to be solved. How to catch that old horse. He has got to get that old horse, somehow, up in a corner, and if the city boy had to do the work it might perhaps take three or four such boys before the old horse would be caught. But our country boy alone has got to solve that problem. He has got to have that horse. He knows he has got to take that milk to the creamery, and he has got to have that horse to do it. He has to solve that problem, and he does it. When he gets that horse he takes him up to the horse barn to harness him, and he may find there that the harness is broken. There is another problem. He has got to fix that harness so that he can get that milk to the creamery within the prescribed time. There is a problem to be met about that old harness. And so it is, as I said before, somehow or other he is always meeting just this sort of work, and these general problems. When that boy goes to the city, and goes into the factory or into the office, and comes into contact with keen minded men, it will be found that no shrewder man will be developed than that same boy who has had the country training.

Now, on the other hand, the city boy never has these problems to solve in any such degree. The country boy in the wider life that he enters upon in the city still finds many problems on every hand that he has been taught to solve. There are problems in dealing with the men that he comes in daily contact with. He has to advise with these men. He has to meet the criticism of these men, and he is here or there with these men, and he has to weigh the statements of this man and come to a decision as the situation may require. Just the same as it was when he was upon the farm. There, all through the day, it was the same thing, and one day was never absolutely like another day. Each day, unconsciously to the boy, for he does not know what is going on, for he takes these things all as a matter of course, but, unconsciously to himself, he is being trained in the way to make him successful in after life. He takes these things as a matter of course, and he says, "Why, certainly, why this is the way it always was, is now, and ever shall be." He does not expect anything else, it is going on this way all the time. What is the effect upon that boy as compared with the life of the city boy, I have already intimated as to the result. The city boy has everything prepared to his hand. The city boy that lives in an easy groove has no problems to solve. It is

all made so easy for him that he has no thought to give to any of these things. On the other hand, the boy upon the farm has problems to solve every day and almost every hour of the day. The one is trained for his future work, the other comes to his life work without that training.

Now take these two boys when they grow to be men and you put them down here side by side, and you put them at work. It makes no difference what it is, for in every business of life there are problems to be solved, the one that has lived in the country has had his faculties trained to the solution of problems, the other his faculties in this respect are dormant. What are the chances of these two boys? Grant that they are equal in natural intelligence. Why, one takes an honored station in life because he has been trained to solve problems from his boyhood. His life has been made up of problems and their solution, while upon the other hand the city boy is racked with every problem that comes to him, and of necessity he fails in their solution. Now that is not only true of the merchant and manufacturer as to all the various kinds of business, but it is also true in those great affairs where men are called upon to command and have charge of large operations, as, for example, in military operations. Take the successful generals of our Civil War. Take the successful generals in any war. Three out of four of them were boys upon farms. The problems they have had to solve upon the farm were military problems to a certain extent. Just let me illustrate what I mean. Yesterday I came home to my place about four o'clock in the afternoon and walked down to the barn, and there I saw the foreman — and I am sorry to admit, but yes, I have a foreman — and five men with him were trying to get a lively three-year-old Devon bull into a stable. I watched the operation for a little while and I said to myself, "Yes, this operation is very like that which is going on in South Africa. I was one of the circle. We were gradually closing in on Mr. Bull. It occurred to me before I had been there five minutes that it was just like the little game that is going on down in South Africa where they are trying to get Gen. DeWett into a hole. The Britons are trying to get around him. What have they got to do? Just exactly what we had to do with the bull. That bull wanted to get through our line, and we had to prevent that. And while we were preventing him from charg-

ing through that line we had to look out for something else. We had to look out for ourselves, and that is just the sort of game that has been going on down in South Africa on the Orange River. We had to watch the bull to see that he didn't turn and give us a dose of our own medicine, and so the British, while drawing the lines closer and closer about the Boers, have had to look out for themselves at the same time. It is an operation in military tactics. General Grant when upon his father's farm in Illinois used to go through the same thing years before he ever commanded an army, in breaking colts and all that sort of thing. And so it was with the other great generals all through the war. So it was with the English general, a successful Irishman brought up upon a farm. There are only two of them that have made a reputation so far.

Now granting equal mental ability to each of the boys, the one from the city and the one from the country, in the test of life, whether it is in military affairs or in business of any kind, the boy who has already been trained to meet and overcome obstacles is the boy who will succeed. Well, you say, what about the girls? What about the girls in the family? They do not get out and corner this old horse in the field and catch him and do all that sort of work. Well, may be they do not all of them, but lots of good women have done it. But suppose they confine themselves exclusively to domestic affairs, they have problems all the while to overcome. Suppose they are putting up preserves. Suppose they are canning fruit. There are obstacles to overcome. They know that if their jar is not perfectly air tight, the air will get in and cause fermentation and that the fruit will undoubtedly spoil. So they must look into these things and know something of the operation that goes on there. Suppose in the family they are making bread. One of the most beautiful and wonderful scientific experiments that can be carried on in any laboratory or in any country home, is that which is done in the kitchen laboratory of the country home in the making of the bread. It requires a high degree of intelligence and scientific knowledge to fathom the great problems of bread making. It is true it may be done without a realizing sense of the opportunity that there is for the display of high intelligence, but there are several things to be considered in regard to the

heating and the water, and the salt, and the flour, and there are problems to be met and overcome all the way through, and it requires a degree of intelligence which is certainly very creditable. This field of intelligence is broader in the country than it is in the city. You may take this rule as a comparatively safe one, that when you concentrate the field of intelligence your knowledge is necessarily limited, but you intensify in degree whatever there is there. That is, within your limited sphere of intelligence you come to a higher degree of intelligence within that sphere. To illustrate. Probably no man in the world knows so much within his sphere of knowledge as the North American Indian. It is true that sphere is very limited, but what he knows he knows better probably than any other man in the world. As a matter of fact, he knows very little, but in the particular field in which he is trained, he is trained to a high degree of intelligence. So in city life where successful men come in sharp contact man with man, the man in the city is limited to a comparatively narrow sphere; what he does know is intensified. Now the result of that is in all these things that grow out of relations or the intercourse of men with men, the city boy is very much brighter than the country boy, but he is limited to those things. He is not naturally brighter, but he may be in those particular things where his faculties have been trained, that is, within the circumscribed sphere pertaining to his limited circle of knowledge. The country boy seems dull in comparison, but when you go into an examination of the relative intelligence of those two boys you will find that the sphere of intelligence or the sphere of knowledge of the country boy is vastly greater and broader and more comprehensive than the sphere of knowledge of the city boy. What has the city boy to learn? What connection has the city boy with all the great problems of nature with which man is connected, and in which man is interested? What does the city boy know of nature, anyhow, except his own depraved nature, and that of the persons whom he meets? Outside of human nature, what does he know? He sees a horse in the street drawing a carriage, or drawing a cart, or it may be attached to a street car, and he knows of the use of a horse in those particulars, but what does he know of a horse beyond this? He knows nothing of animal life outside of the use of the horse in these ordinary matters.

But, on the other hand, look at the country boy. Look at the acquaintance he must have with animal nature; all animals must come within his scope and within his sphere of knowledge, and the birds of the air and the fish of the rivers and the streams do also. He not only knows them, what they are, but he knows how they live, and he knows about what they do to live, and he knows what their uses are to him. He looks up into the heavens and he sees the clouds, and if he has ordinary intelligence he comes to understand the great problems of the winds and storms, of which the city boy has no knowledge. He sees the wind and he sees that the wind is blowing from one direction, and he knows what will be the result of the wind blowing from that direction; first, because of his experience, and second, because of the relations to the place in which he lives to the ocean and to the mountain ranges, and of the plains that may be about him. Therefore, he has a more comprehensive sphere of knowledge in reference to the blowing of the wind and the clouds. He sees the clouds in one stratum of air moving in one direction, and he sees another stratum moving in another direction, and he knows that when those two strata come in contact, if one is warmer than the other, there is going to be condensation of moisture, and precipitation in the form of rain or snow. The city boy will look up between two rows of houses and see these things going on without their meaning anything to him. I never knew a city boy yet that did. I have never known one of them to do anything of the kind. The greater problems of nature, as they arise from time to time in the country, are forced upon the country boy's attention, and so frequently that he comes to understand them, and so for the solution of questions that are asked, my contention is that the training of the country boy is greatly superior to that which the city boy of the same intelligence has.

There is another great advantage which arises from this, and that is that through the contemplation of these things the country boy is led to study. He wants to know why the winds come off from the sea and their characteristics, that leads him into an investigation of the Gulf Stream, and into all those marvelous currents of the sea that affect our climate. Then we will go from animals, and from the study of such things, into the study of other living organisms. His business brings him

right into the vegetable kingdom. He is engaged in work closely in connection with the vegetable kingdom, so that he must understand it, and he must, to some extent at least, go to the bottom, and, with the modern instructions such as we now have in our schools, I cannot conceive of a boy growing up on a farm and becoming a farmer who does not know something of the science of botany. And so we may go all around the whole circle of knowledge, and we will find that the opportunities afforded to the country boy are wider and more comprehensive than those with which the city boy comes in contact.

There are still some things in regard to mental training to which I wish to call your attention. There is an entirely different basis that we accept as the foundation of knowledge. The boy who grows up or the girl who grows up in the city has as the basis of his or her belief or knowledge or understanding what somebody says. What somebody says. The country boy or girl has, as his or her basis of knowledge, what he or she has to find out. Now, please bear this in mind, because it is of extreme importance if you are going to understand the relative relations of these two modes of life. The city boy takes the *ipse dixit*, or say so. The country boy, as his basis of belief, takes what he finds out. When they come together they do not say what somebody else says, or how do you know this is so; it is inevitable. We do not think of it. Many of you may have noticed this thing, and have stopped and investigated. I am anxious that this should be clear before you, so let me illustrate it in this way. A little girl was being taught her letters, and her father said to her, "Now, this is A. You look at it, and you see it has the shape. It is A." "Yes." "Now, it is important that you remember that this is A." "Well, father, how do you know this is A?" "Why," he said, "when I was a little boy my teacher, who was a very nice lady, told me that that was A, and I have always found it to be A from that day to this." "She told you that was A, did she?" "Yes." "Well, how did she know that was A?" And this father had to draw on his imagination, and he said, "Why, when she was a little girl, her teacher was a wise old man, and he told her that that was A." And that was expected to settle it. But the little girl said, "Well, papa, how did she know but what the wise old man lied?" Of course

that is carrying the position a little too far; but, ladies and gentlemen, it shows a great fundamental fact in regard to the mental operations resulting from living and development in the country as compared with that in the city. Now, we generally suppose that the city boy is brighter than the country boy because in those things resulting from the living together of men and from association with men, he is made brighter and sharper. You naturally think that those things enable him to overcome obstacles, and to stand up in the competition of life, but it does not so effectually as the training which the country boy receives. When the country boy comes to the city he seems very stupid, but it is because he is not familiar with the things he sees. Inherently he may be mentally equal to the city boy, and it is simply a question of development. He walks down the street and passes a plumber's shop, and he sees there a sign "cast iron sinks," and he says, "Umph, it is a fool that don't know cast iron sinks," and he goes down a little further, and he comes to a sign which reads, "Take the other door," and, in telling about it, he said, when he went to the door and read that sign, "I didn't dare take the other door, because I was afraid I would get pinched." In one case a boy went down the street, and he saw a sign reading "Cohn & Levy Import Skins." And he says, "I think it is very likely."

But let us take a view of the opposite side of the picture. How is it when the city boys and girls come to the country? Let me tell you a little story in that connection. We keep bees at our house, and have been keeping bees for a long time. We always like to have a little honey on the table, and a very bright city girl came up to visit us at one time, and she walked out around the place, and made various comments. She came up in the afternoon, but she found before night that she had made several little mistakes about things she saw there in the country. So she said she was going to be on her guard, as she didn't like to be laughed at. The next morning there was some honey on the table, and she said, "Now, I have got an opportunity." So she remarked, "Eh, I see you keep a bee." But as it is illustrated in the case of the country boy coming into the city, and the case of the city boy coming into the country, so it is with all of us in a greater or less degree. Take us out of our field, and we all, of course, in a

measure, seem a little dull and stupid, but that is not the point. The point is, which develops the mental and physical powers best, the city or the country, so that they will enable our boys and girls to be useful to themselves, useful to the community in which they live, and serviceable to the State. Between those two, the home upon the farm or the home in the city, it has been shown by experience and shown by investigation after a very full inquiry that the country does accomplish more for a boy than the city can possibly do in the development of those faculties, both mental and physical, which, in after years, enable him to take a commanding place among men.

Now, as I said in the beginning, we are made up of three parts — body, mind, and soul. There is implanted in the human race what we call the religious instinct. Now, it does not make any difference primarily where we are, this instinct exists just the same. There is in mankind, universally, this religious instinct, even among races so low and degraded that we may say they are nothing, still this instinct is to be found. We may even go so far as to take the races that are at the bottom of the ladder in human development, mere beasts, and yet they have this consciousness within them, and that is an argument to show that there is a spirit in every man, and that there is a God above all men.

Now, in the city life, what is there in the surroundings to develop this religious instinct? What is there that tends to lift up spiritual development? What is there in the city that tends to uplift us in this particular? I take the ground that, generally speaking, the relations of life are such as to drag men down in the cities. The general relations of life in the cities are such that there is a general tendency to drag us down rather than to lift us up. There are, of course, exceptions. There are in cities committees, circles, and societies, where there is a high religious life, and where the influences are all inviting and ennobling, but what is there in the contact or relations of men generally tending to the development of religious instincts in our city life? Simply nothing. It is a blank. It is a void. Upon the other hand, in the country there is everything in the surroundings that leads thoughtful men to look from nature up to nature's God. You can put a seed into the soil and watch the effect. Watch its germina-

tion and the growth of the plant and the development of the plant up to its perfection, until it gives back its return of seed to the sower. It is a lesson which forces upon you the goodness and wisdom of the Creator. You cannot come in contact with nature without learning this lesson to some extent; you cannot come in contact with the animals of the country without learning these same lessons. You cannot come in contact with the ordinary things of the country, with ordinary country life, but, what, to thoughtful men, there are things which constantly point upwards. And the tendency of these, its legitimate effect, is to uplift one, and better one, generally. There may be exceptions, of course. There may be some upon whom this influence is wasted, as there are some upon whom everything is wasted, but, generally speaking, this influence has an uplifting tendency upon the mind of the boy growing up in the country. These influences, coming from contact with country life, are so strong that when the heart is given to God, and we come into active life, we realize more and more that from him comes every good and every perfect gift, and that there is in country life that which elevates us and draws us nearer and nearer to him, and so we will find in all those influences that tend to the development and perfection of the physical body and the mental faculties and the spiritual, that the things, or the influences surrounding the home in the country where God's purposes to man are the most fully developed, are certainly the best to obtain that symmetrical development so as to fit one to attain the highest success in life.

There is another side to this question to which I shall ask your attention for a few moments. God puts us here to have the best possible time. I have no sympathy with those long-faced men who talk about this life being a life of toil, etc., etc. God intends us to be happy here in this life and to lead a life of victory and joy, and that life comes far short of God's purpose if it is not a life of victory and joy, and if it does not have the best possible time under the conditions in which it is placed. Now which home helps us in this respect the most? I mean in legitimate pleasures. I mean in purely rational and healthful enjoyment. Look at the influences surrounding life in the country, about the country home. In the first place the fact of its being a home is something that the city child in

many cases cannot and does not understand. What do they know about going home when we use the word home in the best sense? Their home is a place set up like a brick on edge. Of course it is their home, it is their abiding place. When they go in there they are made comfortable, but the point that I want to bring out strong and clear is the fact that about such a city home there are no local associations to endear it to its inhabitant. There are none of those associations clustering around the city home. The home in the city is only the center from which the members of the family go forth and return, but it has none of the attractiveness and around it centers none of the sentiment such as draws us to the home in the country, especially where that home has been in the family for years. What does the light in the window mean to the man in the city? Nothing. When he is ready to return to his home he gets into the street car and the street is lighted with electric lights everywhere. There may be a light in his window, but it has no such significance to him as if he had come driving across the country and saw his house in the distance and saw the light in the window showing him that there was some one there waiting for him. It is sweet to hear the watchdog bay forth a loud-mouthed welcome as we draw up to the gate. It is sweet to know that there is an eye that watches for our coming. That is a pleasure peculiar to the country.

Then also there are the pleasures of beauty from the glories of nature all about, those things that develop the artistic instinct and cultivate in man a taste for those things so desirable. I was very much struck in going through the great art galleries of the old world to observe that about seventy-five per cent. of the pictures in the art galleries were pictures which required a knowledge of country life to understand. Take Rosa Bonheur's celebrated paintings, they are most all of country life and require a knowledge of country life to understand. These are things that a person brought up in the city cannot know and does not understand. City life does not have any tendency in my judgment to develop within us the art instinct. That finds its fullest development in contact with the beauty and surroundings of the country. Country life develops in the intelligent person this instinct to its highest degree, or certainly to that degree where it looks to

the beautiful in vegetation, in the vegetable kingdom, and for that beauty which is found in nature on every hand. So that I say that part of our nature is developed best by country life, is developed more fully and completely than it is in the city. In the country we can develop this latent instinct which lies in man to much greater advantage. We can have about our homes beautiful flowers. We can make our homes attractive by the cultivation of flowers. We can make it interesting to ourselves and attractive to others about us and to every one who comes to us. So the opportunity for the development of the love for beauty which lies inherent in man is greater in the country home.

So I think, ladies and gentlemen, we will find after a rational consideration of the question that the farm furnishes the best possible home for the family, where the father and mother and grandmother and grandfather and children of all ages down to babyhood are gathered—for that is the ideal family. It is not an ideal family that is only composed of young people, or only of middle-aged people, but the perfect family is where old age and middle age and youth and infancy are all gathered together or associated under the same roof. The farm furnishes the opportunity for the fullest development and for the development into the most perfect manhood and womanhood.

But there are other questions in connection with this subject besides this. The tendency of modern business is to separate mankind into classes. The manufacturer in the city or in the large town does not know his men. He is in one little class by himself. Below him is another class composed of the superintendents and clerks in his office. Below that class is a third class, composed of the workmen. The proprietor does not know his workmen by name, he does not know their families, he does not know their lives, he does not know their needs. He does not know their happiness or their sorrows. So with business of every description. It is not so, however, on the farm. All classes are brought together in our rural communities. There is a sort of community of interest. There is an acquaintance and a spirit of friendship that dwells among the people that cannot be found elsewhere. There is no separation into classes, there is no division that is injurious and which may result in danger in the future, but

each man understands and sympathizes with the other and thus there is great safety for the state and for the good of the people.

I trust, ladies and gentlemen, that the consideration of this question will enable us to value farm life, to put a value upon it; because it is a part of the heritage of our profession that we shall have these advantages, and when we have them it is meet and proper that we should know how to value them.

Ex.-Gov. HOARD. I want to tell another little story. I want to emphasize in that way what Mr. Wood has brought out concerning the growth of man's ethical nature when once he is in harmony with nature.

I was raised among the Oneida Indians. My father was a preacher among them. I lived on a neighboring farm. I learned their language when I was seventeen years old, and conversed with ordinary facility in that direction. I undertook to interpret for him once or twice, but it proved hard on the Gospel and still harder on the Indians, and so I gave up that line of effort.

One day, however, there was a great camp meeting, for the Oneida Indians were nearly all Methodists, and in those days they used to unite in great camp meetings. I have been sorry to see them go — but at one of these meetings the chief of the tribe walked out with me into the woods and he sat down one day and gave me this little allegory, or this little picture, that has remained with me from that day to this. Pointing to the upright trees he said, "You see all these trees, beach, maple, elm, hemlock, pine, all different kinds of trees. No tree like other trees. Every tree like himself. God made him so. Every tree grow on same ground. Every tree points up. No tree naked. Each tree have its winter clothes on. Every tree minds his own business. Why not man the same way? All grow on one ground, but all the same point up." And then, pointing to a monarch of the forest which had fallen, cutting a pathway of destruction and sorrow before it, he said:

"You see big tree. Big tree come down and when it come down it hit every other tree. Just so with man. When great man come down he make every other man sorry. So best for man and best for trees, everybody stand up. Everybody then can be happy." I drew from that picture which was painted in that honest way to me by the old Indian chief of that tribe, a lesson which has remained with me all these years. Whether you agree with him or not he was on the same ground with us and he had the right instinct.

Song by Miss Frances Heath.

The PRESIDENT. We will now listen to a gentleman who has addressed the board before, a classmate of our secretary, Mr. Hedges of Bridgehampton, Long Island.

Mr. HEDGES. Mr. Chairman, ladies, and gentlemen of the Board of Agriculture of the State of Connecticut: I have prepared a short paper on the duty of parents to children. It is a very familiar subject, and with your permission I will read what I have written.

ON THE DUTY OF FATHERS TO CHILDREN.

By HON. HENRY P. HEDGES, BRIDGEHAMPTON, L. I.

In the winter meetings of this State Board of Agriculture age is represented, youth and early manhood in less degree. Years speak! Youth opens not his mouth. Your secretary has over-passed his fourscore years. Yet his contemporaries are present. The writer hereof is by some months the senior of your secretary. In short, the presence of us old fellows reminds me of an event in the history of the State of Connecticut which Judge Dagget used to tell to the students in the law school sixty years ago. He said when the law of this State disqualified judges from holding office after attaining the age of seventy years it removed some incumbents from the bench, and with others several very aged men in Litchfield County. These old disqualified judges casually meeting in that county loudly deprecated the injustice of the law. One thought seventy or even eighty years too early an age for disqualifica-

tion, and one old judge over ninety expressed his disapproval thus: "I don't think a man gets to his best judgment until he is over seventy years old." Far be it from me to undervalue the unselfish devotion of the parent heart. When inspiration put in the mouth of David the utterance, "Would God I had died for thee, O Absalom, my son, my son!" it is the voice of nature in all the ages deploring filial ingratitude and infamy. The lament of David is the bitter lament extorted from many a breaking father heart from that day to this. Yet however much the parent loves the child, more than the child the parent, it is sometimes the parent that is unjust. Of one form of injustice I now write. When a son attains majority and the father is abundantly able to pay for his labor ought he to do so? This is a practical question, affecting many families of farmers and others, not only in the State of Connecticut, but co-extensive with the nation and other nations. Some in this Board or audience may think adversely from the writer. I put the question again in other words, sharp! When a son attains majority and the father is abundantly able to pay for his labor ought he to do so? or ought the son to work for his clothes and board?

One reason for agitating this question is this: I have known cases where a farmer with, say five or six sons, well to do, not only permitted but encouraged his sons to work on his farm, getting as pay their board and clothes only, and eventually, with activities paralyzed, ambition suffocated, they were satisfied and competent to earn little more than their food and clothing. Sometimes in my early days, when the whaling enterprise flourished in Sag Harbor, one or more boys in such a family would go on a whaling voyage and often developed ability and power to execute and command, so that the quiet farmer boy with self-reliant foot trod the quarter-deck, the master mariner of his own ship. Not always, but often, the stayers-at-home remained unexpanded and achieved little. Fathers, beware that you restrain not the ambition, and cripple the activities of sons by withholding from them the avenues to successful achievement, and the just reward of their labor. If the laborer is worthy of his hire is not the son a laborer? If the father has a family to support shall not the son at majority be looking to the same liability? In short, is there in the wide range of argument a reason that can be urged to

justify the claim of the father that with equal force does not justify the claim of the son? If the father has earned his competence should not the son do it? If he has inherited his patrimony is he not under obligation to transmit the same to his posterity? If the son could command wages from a stranger for services rendered, shall the father be less just than a stranger? The poor, miserable, good-for-nothing, prodigal son, in his extremity, appealed not in vain to the father. "Make me as one of thy hired servants." At the last month of the twentieth century, have not all the intervening ages softened the father heart, to do the justice Jesus looked for from the prodigal's loving father? Can it be that a stranger will pay and a father not? If not, who can in justice condemn the son who leaves a hard, non-paying, close-fisted, narrow, unfeeling father to obtain recompense for his labor of a stranger?

It may be thought by the father, that, tried by the golden rule, the son should not exact pay for labor. He may urge expenditures for the son whom he has so long fed, educated, clothed, nurtured. But that son's grandfather did the same for his father and paid thereby *in advance* for his grandson. The father may emphasize, and justly, care in sickness, nights of anxious watching, tears of sorrow over faults, and follies, and frailty. But all this debt due from the son the grandfather paid the father before the grandson was born. No! the golden rule is a rule that favors not the father and only favors those who believe in and live up to the principles of everlasting equity and righteousness. If the father says to the son, I want you to work for me for nothing, the golden rule, applied to this want, compels the father to work for the son for nothing, because whatsoever he would or wants another to do for him, that he must and should do for that other. There is no escape, no evasion, no avoidance. The golden rule, which all admit in words and deny in acts, condemns all oppression, all fraud, and looks to the kingdom of universal, everlasting righteousness.

Friends and farmers of the good old Commonwealth of Connecticut, I cannot always commend the conduct and cause of the young. It gives me great pleasure to so advocate and commend it, when it accords with the eternal equities, when it promotes the peace of families, when it attracts youth to the

usefulness of a life of industrious agriculture, when it promotes in the republic the strength of a hardy yeomanry who have been the founders and fathers of institutions the most enlightened, the most free, the most benign, on which the sun has ever shone. Such fathers, such founders, such institutions the sons of Connecticut may justly claim as their grand inheritance.

The PRESIDENT. There is now an opportunity for remarks and general discussion on this topic. It is a broad one and interesting one and it is one which concerns all our families. There is one point, however, which our good brother here has failed to present. He has presented what he has given us most admirably, I would not ask any farmer to do it any better, but there is one point that he has failed to refer to, and that is in regard to the mothers. He speaks of the fathers, but I am sure that some of those here present want to hear something in regard to the mothers.

Mr. HADWEN. Mr. President and gentlemen: I am so full of the remarks of the honorable gentleman that I feel that the old adage might apply to me, that is, that it is but a step from the sublime to the ridiculous, and that what I might say might be that step.

It so happens, Mr. President, however, that I was brought up in the city, born in the city, and never stood upon a farm until I was about ten years of age. Since that time I have been upon the farm, and live in a farm home. I believe in the truths spoken by the gentleman. I refer, of course, to Colonel Wood. I have myself stepped upon the spot where the old cow had arisen early in the morning to keep my bare feet warm. I have followed all the works which a boy could do upon the farm during boyhood. I have even caught the horse which was described by the gentleman, and hung upon his halter until the horse gave up. This is a very interesting subject to me. I am one of those people who believe that while many good men have been turned out through our

modern system of training, yet I believe in the old custom of six months at school and six months in the field. Men that have been raised and developed under that system have been among the strongest ever raised in the country. Let me cite an example in the life of Daniel Webster. He was brought up upon the farm. His father was poor. Daniel in his early life was feeble. So much so that his family never regarded him as being able to do farm work, so his father concluded to send him to school. There was an incident in his life that struck me quite forcibly. When he was sent away some six or eight miles to school he was, of course, unable to get home. A short distance from the school, however, there was a family who had moved up from the neighborhood of Webster's father, and Daniel's father wrote to him that he wished that he might call up and see his old neighbor, and see how he was getting along. Daniel went up to the farmer's house on Saturday afternoon, through the woods, and found the man living in a log house with his family. They had no cow. In fact, they had nothing. Daniel was invited to stay all night, and all that they had for supper was green grass gathered from that lying around. This is the story as told. Was it not a dish of "greens" (?) dandelion, dock, mustard, shepherd's purse, etc., etc., not to be despised for a good appetite. Perhaps that is a primitive way of living, but that incident in contrast with the way farmers live at the present time shows something of the privation of the early farm homes in remote districts. The farm home to-day, however, is quite a different thing. The ladies and gentlemen present are a good illustration of what the farm home is to-day. Our country homes to-day are among the best to be found in the world.

In thinking of this subject I am reminded of an incident in Boston, connected with a gentleman who lived on Beacon Street. He was wealthy and had all the luxuries of city life. He had his horses and his carriages and his coachman

and his footman and half a dozen servants in the house. One day when he was riding out he chanced to pass by a humble cottage compared to his home, but which was surrounded by all the beauties of nature, and he looked upon it and exclaimed, "Give me that cottage with a man servant and a maid servant, and I will give you my whole establishment in Beacon Street." That is only a practical illustration of the comfort that can be enjoyed at the farm home.

It is true that the farmer has learned, and his wife also, how to enjoy the farm home as it should be. I mean the higher elements of the farm home. I don't think it is well to do anything extravagant, but so long as the expense of the home can be kept within the means of ordinary agricultural pursuits, it is well. But the home should contain all the comforts of rural life; as many as the means of the proprietor will warrant. It should have all the conveniences inside. Its comfort is certainly an important factor in making it enjoyable. Also upon the outside our country homes should be embellished with flowers and trees and everything that can contribute to good, wholesome living.

My prejudices are decidedly in favor of the farm. I believe that the best men and women have been reared upon the farm. I believe while the nineteenth century has brought forth many ameliorating conditions among our farming classes, yet at the same time I believe that the twentieth century is going to do a vast deal for the farm and for farming classes. We have taken very rapid strides upward in the last fifty or sixty years, but I believe in the century that we are now entering upon, the advance will be immeasurably greater than that which has been already made.

The PRESIDENT. You know, gentlemen, our Governor this morning gave us a fine exhibition of what a farm can do and of what a farmer should be. In these modern days we are all of us very apt to be carried away with the idea that money making is the chief end of man. That should not be

the one great aim on the farm. I do not feel myself entirely competent to speak upon this question, but I have read a great deal and thought some, and I would like to speak of one or two points in connection with this subject. It has always seemed to me that the farm has served a very useful purpose in society as the rearing place of the best men and women. After I was nine years old I never went to school in the summer time. The boys went to school in the winter and came out in the spring and went to work on the farm. I was brought up on a farm and was educated to a large extent in that way. Now there is one thing I want to say in regard to the farming occupation. In a city suppose that a man has six boys and four girls. Ten children. That's a pretty good family for a city family. When they arrive at a working age, what do they do? They are not working on one common line. One goes here into one employment and another there into some other employment or occupation, and the business or occupation of all of them is different. They are not interested in the same line of work, as a rule. The result of that is that their interests, of course, differ. Take it upon the farm, and there the boys and girls as they arrive at their maturity, if they remain upon the farm, are all interested in one line. It seems to me that that has a great tendency to hold the family together as it should be. What one is interested in, the others are interested in also. They are always ready to waive their rights and their privileges as the others may regard them to accommodate the other members of the family. When this is the case they cannot become so selfish and narrow as where the interests of all differ from the others. They are obliged to live together and to work together, and each becomes willing to discommode himself or herself for the benefit of the others. Boys and girls in the country who are brought up in families where there are several children do not have, in my judgment, that narrowness of character which comes to those who live simply for themselves. Where all have a common

interest and a common pursuit upon the farm, and are brought up that way, after the children marry and go into homes of their own, if they still continue upon the farm, this training which they have received clings to them and affects their whole lives. It makes them careful of the rights of others and keeps down the natural selfishness which crops up where there was no such training.

Now, there is another thing: years ago I used to be a school teacher, and there was one thing in particular that I noticed. The scholars who lived the farthest from the school were usually the most prompt in attendance. Those who lived right in the village where they had nothing to do or had to make no effort in particular to get to school were tardy more often than those who lived at a distance. The children of the merchant and the minister and the children of the lawyer as a rule were the last ones in the school. When you put down tardy marks five out of the six would be charged to those children that lived near the schoolhouse. Now what is the argument from that? Those village children as a rule had no duties placed upon them, but the boys and girls that came from one or two miles distant almost always were there on time, and if you gave those boys and girls anything to do they were the ones that did it. It was because they were trained to the idea that they must be prompt. They had their duties at home and it was impressed upon them that they must be on time. That was a most important reason. In the morning, if they wanted to accomplish anything before they came to school, they found that they must get up early. They were taught the lesson that if they were to accomplish anything it could only be done by hard work and by effort. Another thing: I have noticed that the boys and girls who had exercise by traveling or walking to school were the ones that got their lessons as a rule the most quickly. I mean, that what they got they held. Perhaps some of them were not so quick to learn as those who lived in the village, but there was one

thing that they did, that is, they held on to what they got hold of. They had exercise and got their systems and brains in good condition, and when the reviewing days came they were the boys and girls every time that could tell what they had learned.

Give the boys and girls something to do while they are studying. Give them exercise. Let them go out into the air and exercise their lungs and their limbs and their eyes and their minds. Let them have the school training and the field training at the same time, so that the physical and mental natures will be developed together and grow up in sympathy and harmony with each other, which is far better than where a boy or girl spends all his time in the schoolhouse or in study. Their education obtained in that way will do them more good.

The day has gone by when anything or everything can be made a farmer. Nowadays it wants the brightest boys and the best girls to make our farms successful, and they must be the best educated of any class on the earth. Our modern system of feeding animals is one of the greatest of sciences. Our successful farmers to-day must know something about the soil and about these things that are being constantly brought out, if they would take advantage of every facility within their reach to make their occupation successful and pleasurable. Our farmers are face to face with the fact that they cannot come to the front unless they put in practice the teachings of science. They cannot use the old methods any longer. They cannot come to the front unless they use these means which science is placing in their hands. And if they would use the tools they must learn how to make the most effective use of them. Our farmers' boys and girls ought to have every facility for education, and it is a great blessing that the means of obtaining that education are now within the reach of every boy and girl, whether upon the farm or in the town. If they fail to take advantage of these facilities for

education which are offered, they must not complain if they fail to take rank in their proper place.

I see Mr. Hale down in the audience. I suppose he is tired of listening and I will call on Mr. Hale to say a few words on this subject.

MR. HALE. Mr. President and fellow farmers: It is rather of a difficult position to attempt to talk when you haven't anything to say. I have been listening with a great deal of interest and pleasure, and I don't know that I have anything to add to what has been said, and said so well, by our friend from New York and those who have followed. I thought, however, as I sat here, that very possibly the gentleman meant more than he said. He has eulogized the farm home and life upon the farm and spoken of its value in character building, and the strength that it gives to the cities, but his speech was a glorification of the farm boy as a useful citizen in the world outside the farm. I presume he took it for granted that there are plenty of boys still on our farms. I have wondered whether he meant that. I hardly think he did. I wish that we might have a little more talk about the men and women that stay on the farm. I wish that we might have a little more talk, or a little more appreciation of the farm as a place to live on and to die on, if we must die. For my part, I want to live on a farm forever, but I suppose there may be some better place somewhere than a Connecticut farm, but that is certainly good enough for me. It is a well known fact that many of our hardy boys raised upon New England farms have gone into the cities or larger towns and become successful men, but I wish that we might spend a little more time in glorifying the people who do stay on the farms, and in showing why it is worth while for them to stay there. While we may bring up bright boys and girls and send them away to take an active part in the life of the towns and cities, some of us have got to stay back on the old farms, and I believe those that do stay can be just as useful citizens and be just as

happy and just as successful as any of those who go away anywhere else on the face of the globe.

Professor BREWER. Mr. Chairman: I want to elaborate a little and put a little more strongly what Mr. Hale has said. I spent my boyhood and youth on a farm, and since that time have lived mostly in the city. I have seen both classes of life. It has seemed to me, and I have thought so for a long while, that one great danger which lies before our country and before citizens to-day, is the diminution in the numbers of country population. The commercial and manufacturing conditions of the present day have made great cities the places, not only of trade, but of manufacturing. It was not so when the old men here were young. It was not so when they were boys. The manufacturers of the country and the business of the country was not concentrated in the cities as it now is when they were young, and this great movement that is going on everywhere by which cities are being built up is because under modern conditions manufacturing and other large enterprises can be carried on in the cities to better advantage. All these, or a very large part, was formerly done in the small towns. This trend of population away from the rural districts to the cities because of this change in the industrial situation is one which is fraught with great danger to civilization, in my judgment. Some years ago I delivered a lecture before this board on the educational influence of the farm. One of the speakers here referred to six months upon the farm and six months in school being a very good form of education. I believe myself that six months on the farm and six months of school training will show better and more uniform results than in the case of ten months in the schoolroom. I was a man grown and even more than that before I knew how people grew up in the cities, before I knew that there were many who almost came to manhood before they had ever seen the sun rise or who knew where the common articles of food came from. It was

a surprise to me when I began to learn those things. It is surprising what ignorance is manifested by children who are taken from the cities into the country. I took a waif myself to give it air and an outing, and have had some experience. I wish that more of this might be done. It is a most valuable thing. Children are quick to learn, and when taken into the country they learn of the animals, the sky above them, and the earth beneath, and there is no other place in the world that has so many special educational influences. The very reason why the farmers' boys stay upon the farm instead of going to the city, or a part of it, is because of the education which they get there through their fathers. There is no other education in which a boy feels that he is a member or a partner in the firm so intensely as upon the farm; even in driving cows home to be milked he feels he is a useful member. It is a way in which he is a member. He gets a portion of his education that way. He always has to use his judgment. There are always things for him to do upon his own responsibility. I think a good many fathers do not know what a serious problem it is to bring up boys in the city, what to do with them; and when a boy in the city is brought up and has been educated, what chance has he equal to the chance of the boy upon the farm? You may have seen a few days ago a notice in one of our papers of a lost child. It is a matter which had occupied the attention of the police. The boy was found and his father was sent for. The father went to the police station and he stood looking at the boy, and he said, Well, I can hardly swear whether that is my child or not, for I haven't seen him by daylight for more than ten months. My work calls me from home before it is daylight, and before he is out of bed, and I do not return at night until after he has been put to bed. I have not seen him. I do not know how the little fellow looks when he is up and dressed. Now, that condition of affairs, ladies and gentlemen, represents something worthy of serious consideration. There is no such con-

dition as that surrounding the educational influence of the farm.

I wish that this subject might be brought home emphatically to all present, and to our farming population generally. That is the great advantage which accrues by staying upon the farm and making the most of our New England hill-sides through the application of modern means. I think that the tide will turn, and that the trend of population will be toward the country in time. But this depopulation of the country towns is certainly a matter fraught with the greatest consequences, and we should do all we can to prevent it.

Ex-Governor HOARD. Mr. Chairman: Pardon me if I say just a word or two on this subject. I think you are on a very momentous topic. Prof. Brewer speaks about the decline of our suburban population. The last census disclosed it with greater clearness than ever before. In my opinion it is a question of demand and supply. The country will continue to decline in population until food becomes scarce enough to send men back from the city to the country to find profitable employment in producing food. It is a question of food. It is the same with man as it is with wild doves, or the same as it is with wild animals. All animal life gets where it can feed the best in its own opinion. It may be mistaken, but that is a law of nature that all animal life seeks the best feeding grounds. That law applies to man to some extent.

Now, there is another point, my dear friends, in which you and I and all our fathers before us have been derelict. Here is Yale College standing here in New Haven as one of the most marvelous institutions of learning in this country, and yet it has educated thousands and thousands of men away from the farm. Every high school in the United States is educating young men away from the farm. All the forces of education are simply educating the people away from the farm. A German citizen not a year ago, and he was one of the brightest German farmers in our country, a man of splendid edu-

cation acquired in Germany, when I said to him, "William, why don't you send those boys to school?" he replied, "If I was in Germany I would do it, but your American schools make anything and everything but farmers." I could not but see the force of it. He said, "I want my boys to be farmers, and I must of necessity keep them from going to an American school, for the American schools teach a boy anything but how to be a farmer." I said to him, "William, that is a partial view of the case, I believe, for there is a great deal of force in it, but why don't you send those boys to the common school, and give them a good thorough common school education?" "I think I ought to," he said. And he says, "I don't know where to send them after that." Then I said, "Send them to our short course in the Agricultural College. Don't send them there to take a four years' course unless they show conspicuous adaptability for it, but send them to the short course." And right there, ladies and gentlemen, I want to say to you that the Wisconsin short course, with its three or four hundred young men in that university every winter, is doing more to stop this tide of discontent on the farm, and the flow of young men from the country and from the agricultural pursuits to the city, than any other course we ever set in motion.

Now, my friends, I think we ought to do one thing more. We have commenced to do it in Wisconsin. They have commenced to do it in Ontario. We ought to go to the mountain, and not compel the mountain to come to us. We ought to begin a thorough course of training in agriculture in our common schools. Let me illustrate what I mean. I have received, as editor of *Hoard's Dairyman*, thousands of letters which show a lack of knowledge of even ordinary things. You know, or those of you do who read the *Dairyman*, that we have a department devoted to the answering of questions relative to dairy cattle and other matters, and we are obliged to use terms that are employed in agricultural chemistry,

because there are no equivalents for those terms in common language. Men write me from all over this nation, "What do you mean by the words you use? I don't understand your language. I never had education sufficient to give me an understanding of it. What do you mean?" Those questions were so numerous that we had to put at the head of this department a glossary, and there you will find it in our paper. It is a standing comment to-day upon the insufficiency of common school education in the United States that that glossary stands there as it does. I want to read it. I want it to sink deep into your minds as showing the necessity of some practical education being given by our common schools to the young boys that come from the farms and in the literature of the farms, and as to the terms used in the discussion of ordinary topics of the farm.

"The terms used in the discussion of feeding problems in *Hoard's Dairyman* have the following significance:

"Ration. — The total allowance of feed for twenty-four hours.

"Dry Matter. — That portion of a feeding stuff which remains after all the water or moisture has been expelled by heat.

"Digestible Nutrients. — That portion of the dry matter which can be digested by the animal, and does not pass through the bowels as excrement.

"Protein. — That part of the digestible nutrients which goes to the formation of lean meat, ligaments, hair, horns, and the casein (or curd) of milk. It is generally believed, also, that protein may be, and many times is, converted into the fat found in milk."

I have had hundreds of men, yes, I might also say thousands, write me thanking me for this little bit of educational work.

What is education? It is nothing more than contact. Why, contact is the very sum of education. The contact of

the American Indian with what he is brought in contact with is the sum and the measure of his education. Contact everywhere. Now, is there any reason under the sun why a little district school should not teach some of the elements of agriculture; should not teach the meaning of the terminology of Agriculture? There is no reason on earth, good friends. One reason to-day why young men leave the farm and go to the city is because they do not know enough for farming, and because they do know enough to stay in the city. That is just exactly it. They do not feel competent to wrestle with the problems of the farm, but they do feel confident that they can wrestle with men in the city. I believe that is a vital point. If we are to stop the depopulation of the farming districts we have got to put into the mind of the young boys some elementary knowledge at least of agriculture so as to create a tendency toward agriculture and toward a comprehensive knowledge of the problems of the farm. That should be made a part of the early education of our farm youths. Now, in France, they do this thing. The commissioner of agriculture or the minister of agriculture wrote me that in France they have 600,000 schools, or very nearly that. See what an influence those schools are constantly creating where they are all teaching the simple elements of agriculture. If you turn to the report of the committee of the English Parliament, recently issued, you will find there a most wonderful epitome of what is being done all over Europe in this direction. The chairman of this committee and the great statistician, Mullenhall, was commissioned to find out what was being done for the farming education of children. This report was one of the things that opened their eyes to what Germany was doing for her young people on the farm.

Let me illustrate by repeating what I said in a recent lecture. In speaking to a German about a piece of old, refractory, stubborn land, "John, what is the matter with that land, it don't act right. I want to know what you think about it." And he answered, and he

says: "That land has no humus." You may wonder where he got that word humus, that is not an ordinary word used on the farm. So I said to him, "What do you know about humus?" And then he told me. He said, "I learned that in school." Now, you go into the ordinary district school, and if you can find any boy in the United States that has been taught the meaning of that word humus, I would like to know it. Of course that is, outside of those districts where they are taking this matter up in the school. I said to him, "John, what is humus?" and then he came at me with a mingled discharge of English and German, and he said, "Humus is decayed vegetable matter that is in the soil. It is different from mineral matter, as it is plant food." I said, "John, is there any other thing that it does except furnish food?" "Yes." "What does it do?" "It brings out their moisture," and then he said to me, "Plants drink, they do not eat." Now, don't you see that German system of education in agriculture had taken that little boy, and he had not gone to a school after he was fourteen — that German system had taken that little boy, and had instructed him in a most important thing to know. He is a better farmer to-day than I am. He is a successful manager. It was the fact that in his little German school he was taught the meaning of terms and principles. He was not taught practical farming, but he was taught scientific definitions of things — what they meant, and the result of it, so that when he saw occasion for the application of principles he was ready to bring his knowledge into play. And that is the reason to-day, or one of them, why that whole great population of the West has been so marvelously successful in farming. We have a great many of those Germans in this country.

My friends, it is time we took action in this and began to shape our education in our colleges and in our district schools so that our children may have some knowledge in this direction. Ninety per cent. of all the farmers to-day never

had any other schooling than what they obtained in the little district schools, and we ought to see to it that the forces of education should not be misapplied, but that they should be directed to teaching the elements of agriculture in every school. If that had been done years ago it would have made a marvelous difference with the progress of agriculture in this country. When that is done our country boys will be able to wrestle with the problems of the farm, and then thousands upon thousands of our best youth that would under other circumstances flee to the city, will remain upon the farms. It will save them to the farmers, and I believe to the salvation of this country.

The SECRETARY. I want to give an instance in regard to a lad which came under my charge a few years ago. The instruction and advice I received from his father was this: We were discussing matters of various kinds. This was a lad in his early teens, and well educated in the city schools, had been carefully trained in the family, and in the use of the English language. He knew, however, nothing about the various phraseology of the country, and his observation was not so sharp as some. He was like a common city lad in that respect. His father said to me, I want to have you take him and make an Indian of him for a year or two. From that I took my cue as to what his father meant, and I proceeded to do the best I could. The change that took place in that young man in the course of the year or eighteen months that he was with me was marvelous. I sent him into the woods whenever I had opportunity. He always learned something on those excursions. One day when he came back he had discovered that the maple sap was cold when it ran from the tree. From his city education he expected that the sap was the blood of the tree, and of course it was warm. He came home at night, and told me of the discovery that he had made. It was opening his mind to the nature of things around him. One of his duties was the collecting of the eggs from the

poultry. He reported to me one day that there were two eggs laid in one nest, and that they were not laid by the same hen. He had been making original observations in regard to things that he had never thought of before. These were simply small incidents in his progress. He had a calf under his charge that he was feeding. The calf died. The servant girl in the kitchen, when she heard of the occurrence, said to him, "Did the calf kick the bucket?" "Oh, no," he said, "the calf never could get at the bucket; I put it in a place so high that he could not reach it." Slang phrases like that he never had heard. He could be sent on errands through the woods or anywhere, and he would see things on every side that he had never thought of before. He observed and thought for himself. It made him independent. He returned to his studies, and his bodily vigor was equaled by his powers of observation and mental growth, not from books, but from contact with nature.

The PRESIDENT. I think there is one thing further. There is just one thing more that to me is a matter of considerable moment. It is this: you take a farmer that has been tolerably prosperous in his business; he has become established, as they say, and has become accustomed to certain ways of doing things. His boy grows up, but does not see things just as he does. His boy would like to try some experiments. His boy would like to branch out a little, and exceed the bounds of his father's usual routine. The father says he must not do it. The father says no. The mother sometimes is a little inclined to take the boy's part, and sometimes she is inclined not to. Sometimes the father would be more liberal than the mother. Now, the mother wishes to keep the boy pretty close to her. She does not like to let him get away from her. That father and that mother are making a mistake. I know of some mothers that have made mistakes in this way when the fathers have not, but I know that there are fathers that are apt to hold the boy back and restrict him to the old-fashioned method of doing things. The father

has been used to doing things as they were done in his day and generation, and, naturally, dislikes to see them set aside and upset, but fathers should remember this, this is a world of progress. Fathers should remember that there are better things in store for us than they ever had. Now, if a boy or girl wishes to try some experiment or do something that is out of the usual line, for heaven's sake let them do it. Let them be a little independent. Give them a field in which they themselves are master, and do not restrict them in every respect. If you do you will drive them to the city. I believe that fact stands more in the way of our farmers than any other thing.

Now, I will tell you another thing. In the old town of Washington, in that region where I was born and brought up, there were a class of farmers who were quite well to do. They had accumulated quite an amount, which was considered quite enough for a farmer to get, and the thing stopped about there. It was thought the boys could not beat that. The thing remained just about that way for years. Twenty-five years, perhaps. By and by some of the old men died, and some of the old properties fell into other hands, and some of the old families became extinct. Other men from the city came to Washington and bought those properties and greatly improved them, and they are beautiful places to-day. But these men that bought them did not make their money there. They did not earn a dollar of it there. They were millionaires, and they took those old farms with their rough land and converted them into beautiful places. It is money that has done it. It has been a great object lesson. The ordinary farmers of that section, of course, could not afford to pay for any such work as has been done. It has given the boys and younger men there employment, but it has made them discontented. They have said, we will go to the city. We will go to the city and make money as easily as they have done, and then we will come back and take these farms. That object

lesson made the boys discontented, and they have gone away. The families who have come back there in the way I have related are not the families who were farm reared, or who were born and bred in that neighborhood. They are families of wealthy city people who never have been used to the hard labor of the farm, and who simply come up there for a few months in the year to stay. The local farmers see the difference. The young men note the difference. Now, the farmers' boys in time have got to take the farms, and I say, by all means give them a little rope to experiment, to expand, and to see what they can do, and to make their homes as enjoyable as they are to these millionaires, and not to take the opposite course, and drive them away. Our policy ought to be to hold the boys on the farms, and we ought to do everything to encourage them to stay.

Prof. PHELPS. Mr. Chairman: I do not want to continue this discussion beyond reasonable bounds, but it seems to me that this is a two-sided question, and we need to take the bull by the horns and see if we cannot throw him down, and find out all about him. Now it seems to me as I have listened to this discussion, and as I have given this subject a good deal of thought, that there is another side to it that we need to consider very carefully, and that is the question: Why is not the farm home a better home than it is to-day? If we solve that question, would not it, in a measure, solve the question of keeping the boys and girls on the farm? Do we make the farm home what it should be? Is it made as attractive as it should be? I am sorry to say that many farm homes are not such places as to attract young people, or which tend to hold them or content them. Now, we might as well look that question squarely in the face, and see where the trouble lies. In the first place many a farm home is not made as attractive as it should be, they are simply places of routine business, and routine drudgery. Nine, ten, eleven, twelve, and thirteen hours of work a day. The young farm boy and farm

girl feel a degree of irksomeness under this condition, and do not feel that they are getting the enjoyment and freedom out of life that country life should give.

Now, why should we not endeavor to surround our farm homes with just as many comforts, and with just as many opportunities for culture and facilities for education as we possibly can? But it seems to me that we don't do as much on that line as we ought to. We don't do as much to educate the æsthetic tastes of the young as we should. We don't surround our farm homes with flowers and fruits and with shrubbery, and many of those things which add to its attractiveness as we ought. Many of these things cost but little labor, and add vastly to the appearance and comfort of a home. We do not keep on our sitting-room tables as much of the best literature of the day as we should, and of the current magazines as we should, and hence the young boy and young girl when the day's work is ended, finding nothing of especial interest to attract their attention, and if they are not so tired that they want to go to bed to get physical rest, why, they are off to the neighbors, and they are visiting and perhaps doing anything and everything except that which will tend to elevate and ennoble them.

Now, on the other hand, I find that we do not give, in many cases, any opportunity to the farm boys and girls for using their powers of management. This question has, perhaps been referred to, yet it cannot be brought out too thoroughly: the need of giving the young an opportunity to exercise their thoughtfulness and their skill and their ingenuity in the management of the little affairs of the farm, where they can take an interest, and have the responsibility entirely their own. Give them some little department to manage and care for. For example, give them charge of the poultry; let them buy all the feed required for the poultry. Let them have the income of the poultry. Let them see what the profit is from the management of it. If this is done you

will find they will begin to take an interest in the operation of the farm, and begin to realize that there is something in farm life besides mere drudgery. If we surround the young people with these opportunities for management and for bringing out their latent faculties it seems to me that they will begin to appreciate that there is something in farm life besides mere work.

Another thing: It seems to me that we don't make the effort that we should in opening their eyes to the beauties of nature round about them. Now, I know in my own experience that up to fifteen or sixteen years of age I always lived in the country, and yet the country had no beauties whatever to me. I didn't see them. That is all. They were there, but my life had been such that my eyes had not been opened to them. What we need to do as fathers and mothers and teachers is to help to open the eyes of young people and get them to see the beauties of nature, and get them interested in questions of natural history, and thus to lead their minds into channels of thoughtfulness and develop them into lines of scientific thinking, and thus fit them for the education that will follow, and that is so much needed as they become a little older and want to go away to school or college. If this is done it seems to me that they will have an interest in nature that will last them throughout their whole lives. I think the farm home is the place to start this thing, and to get the young interested in natural history such as they find about them at all times and on all farms. If we as fathers and mothers and teachers would do more to make the farm an interesting, pleasing, and helpful place, and a developing place, if I may so term it, for the young, we would not be asking so often "Why do the young people leave the farms?"

The PRESIDENT. I know Prof. Phelps is doing a great deal, and I am very glad he has spoken on this subject. Some of my young friends who have gone to Storrs are taking a

great deal of interest in these things, and it cannot fail to be of great good.

Mr. KIRKHAM. Mr. Chairman: I would like to mention the fact that at a meeting of the Board some time ago, my impression is it was after the reading of a paper by Mrs. Annie Trumbull Slosson that discussion was opened, and something was said about the teaching of botany in the public schools. I had always felt the need of that, and I introduced a motion that this State Board of Agriculture recommend that the study of botany be introduced into our common schools. The resolution was not passed, but I simply wanted to ask whether such a thing would go now or not.*

Ex-Governor HOARD. I certainly believe you can do something by teaching the botany of farm plants. In Wisconsin we are working along that line. We have started already to teach the botany of clovers and some of the other farm plants.

Mr. KIRKHAM. I believe that if that was done in our State, Mr. Chairman, or, generally, throughout the country, Governor Hoard would not have to publish a glossary in order to inform the farmers as to the meaning of technical agricultural terms.

Mr. HALE. The gentleman speaks of the farm lacking in literature and in the current magazines. Prof. Phelps referred to that. I want to put myself on record as saying that in visiting among the farm homes of New England and also city homes, I found more good literature and standard books on the tables in the farm homes than I did in the city homes.

*NOTE. Mr. Kirkham's memory was not very clear. The resolution offered by him after the reading of Mrs. Slosson's admirable paper, Report of 1885, "A Talk with the Young Folks of the Farm," was passed.

The resolution about the study of botany in the common schools, which was not passed, was offered at another similar opportunity, for this general subject of nature studies has been often presented to the Board and has steadily gained ground, and its claims are now admitted by all progressive educators.

The PRESIDENT. I can say that at my home there are so many there that my wife don't know what to do with them.

Col. WOOD. Mr. Chairman: I suppose it is my privilege to close this discussion, and, as the time has arrived, I will proceed. I frankly admit the words of criticism of Mr. Hale and Prof. Brewer on my remarks. I did not speak of how to keep the young people upon the farm. I thought that if I illustrated the fact that the farm offered such and such advantages for the development of men and women to their greatest perfection, physically and mentally, that I had covered the subject, and so I purposely avoided the question of keeping them upon the farm, because I was not equal to the task. That is my reason for now discussing that part of the question. Governor Hoard has stated all there is to that question. It is a question of supply and demand; just so long as our sons can get better employment elsewhere they are going to leave the farms, and all the sentiment and all the talk about it will be time wasted. The time will come some day again when the farm will give more profitable occupation and employment than mercantile life does now. Until that time comes I don't think you want your sons to remain upon the farm. We want them to do as well as they can. There is a lot of talk on this subject that it not worth notice. You want your sons to do the best for themselves, and I want that for my son. If the farm is the best place for them, we want them to stay there, but if the farm is not the best place, we should not do anything to hinder them from getting away. They cannot get better returns to-day on the farm for their labor than in the city. But I believe that the time is rapidly approaching when that condition of affairs will be radically changed. We have heard a great deal about the American market for American manufacturers. We have heard a great deal about the theory that the time would come when our manufacturers would supply the American market, and that there would be no chance for agriculture to revive in

the East. But just so soon as we had arrived at that point when we could supply the American market, to the amazement of every one in this country, we found that not only could we supply our own market, but we had grown so strong that we could compete with all the world outside of its own borders. Things have opened up wonderfully before us. We do not know where we are. All Europe stands aghast, lost in amazement, in consideration of what there is before us, before the manufacturing industry of this country, and our agriculture as well. A new career has opened up before us since the close of the Spanish war, within the last eighteen months. We have seen it open within two years at the farthest. We cannot say when the time is coming that there will not be an opportunity for young men outside of farming, but I am sure there is to be a new era in American agriculture. It is coming, and is due largely to the special instruction in agriculture that our people have been receiving. Your State Agricultural College at Storrs and our university at Cornell, and the short course term that Gov. Hoard has referred to at the Wisconsin University, and in every state in the Union where such schools have been established, there is a stream of influence going out which is fraught with the highest consequences to the future of American agriculture. On every side throughout the length and breadth of our land this kind of instruction is going on, and increasingly so. Experimental stations are being established, and there is more work along scientific lines being done on this subject than in almost any other department of human industry throughout the world. There is no interest on this earth on which there is so much thought and so much scientific attainment, and so much expert skill being exerted as in the agricultural schools and experiment stations to-day. It is a marvelous thing. It is beginning to show its effect. But as to the solution of this great question of having the farm made profitable in competi-

tion with other industries, there may be some doubt at present, but as to the future there can be no question.

I am not one who believes in taking a gloomy view of the future of American agriculture. When I was discussing the question, I purposely avoided discussing why our boys left the farms. I do not profess to be a judge. I do not like to talk upon a subject which I feel I am not equal to. That is all there is to it in this matter. But I tell you there are many hopeful signs to show a wonderful future for our craft. A wonderful career I feel very confident is to be opened up, and it is growing out of increased knowledge of farm methods. The American farm is going to be more profitable in many instances, and it is going to become profitable where it was never profitable before. The abandoned farm, in nineteen cases out of twenty, was abandoned because of ignorance. That may sound strange to some of you New England men, but that is a fact. The competition of other industries was successful, because there was not enough intelligence used to run the farms profitably. Mr. Hale has been one of the very useful men in this country in calling attention to the fact that under proper conditions we can grow certain fruits, even peaches, in our northern latitude. His success is a splendid illustration of what can be accomplished when skill and knowledge and energy are combined to bring about success. He has demonstrated that with proper intelligence and skill they can be profitably cultivated, and his success has been a splendid example, so that others are doing that thing throughout the country. Increased intelligence in farm work is doing on the farm what could not be accomplished in any other way, in spite of the competition of other industries. Increased intelligence in our farm work, especially in the East, is to be our salvation. These Western people have swamped us in competition. Stop a moment and consider what has been done. California, notwithstanding the fact that it is almost three thousand miles off, and notwithstanding the cost of transporta-

tion, has swamped us with fruit, but, even in spite of that, we are beginning to beat them on their own ground, as Mr. Hale and others have demonstrated that with intelligence in the marketing of fruit, and putting it up in attractive packages, such as the consumer wants, we can hold the trade even against the California men.

All these things are assuming a very hopeful aspect, and I think Governor Hoard hit the nail on the head when he said that after all it was simply a question of supply and demand. That is the whole thing. I believe we may find that the great question of supply and demand is at the bottom of the whole thing of keeping the young men on the farm. When our farms will pay as well as the average of other industries, our young men will go into farming as an occupation. Until that time comes it is not reasonable to expect them to do so. That fact, with the increased intelligence in farming methods which will, as I say, bring about increased profitableness and greater economy in farm operations, is to solve the whole question. The only thing to do is to encourage intelligence and encourage the dissemination of more knowledge through these agricultural schools and the experiment stations. Through them we have a flood of agricultural and horticultural knowledge and influence that is spreading over the country and that is giving this much-needed information to almost every man and child in the land. That is our only salvation and that is the only hope we have for our agricultural interests in the East. Until that time shall come, when the pendulum shall swing in the balance and the trend of events shall be the other way from what they have been, conditions in the East will be no better. The trend is now that way. All the signs are hopeful. Eventually it will come. We may not be able to see it, but in the meantime we can accomplish a great deal in this direction for the attainment of this great object for which we so ardently hope.

Secretary Gold makes the announcements for the evening meeting.

Convention adjourned until 8 P. M.

TUESDAY EVENING.

December 11th, 8 o'clock P. M., 1900.

The meeting was called to order by Vice-President Seeley. A few short discussions followed on questions from the question-box.

"Will sour meal, when fed to milch cows, affect the milk?" Here is Dr. Jenkins, of the Connecticut Experiment Station; he ought to be able to answer that.

Dr. JENKINS. I never fed sour meal, or sour grain of any kind to cows, but I suppose any good feeder would say it was not a safe thing to do, and wouldn't do it, if it could be avoided. In general, it is not safe; might be done dozens of times without injuring the cows, but those things are unsafe.

Mr. HINMAN. Mr. Chairman: I think that it could be easily seen that it would affect the milk; for whatever affected the cow, anything fed to the cow that affects her general health, affects the milk. If the cows eat sour meal, there will be two or three messes of milk that ought to be thrown away.

Clover is one of the nicest things for a cow to eat, in the world. But if a cow gets into the clover, she eats too much, so as to make her sick; it affects the milk so it will taste, and will affect butter, — spoil butter. Whatever affects her general health will affect her milk the same way.

Question. "If the farm home is the best, for the three-fold development of the boy, why is it that the farm boy so often becomes sadly degraded in character when he moves to the city and lives under city conditions?"

Colonel WOOD. He does it in spite of the education that he had on the farm, — not in consequence of it; because it did not have its full development upon the character of that boy, that he becomes degraded and depraved when he goes to the city. The trouble is with the boy, not with his training.

Question: "On what kind of soil are ashes most useful?"

Dr. Jenkins again.

Dr. JENKINS. They are very useful on heavy soil, or very light soil, and excellent on any kind of soil. I think that is a proper answer to that question. It is certain that they act as a corrective to the soil. I think the value of ashes consists more in the lime they contain than in the potash.

Chairman SEELEY. I would like to ask Dr. Jenkins a question, suggested by the answer, — a lime kiln was burnt near us, and the farmers have asked the question, whether that lime is worth drawing five or six miles and spreading on the field; they put it in large sacks, and it will set them on fire in carting, — almost your wagon; they give it to the people if they will haul it away; the question was asked me, — I couldn't answer it; I had had no experience whatever.

Dr. JENKINS. On those soils, presumably, you have enough of lime; it would be on some soils a very good application, from a thousand to two thousand pounds or more to the acre; but in the vicinity of the lime kilns, I should be more doubtful of its effect, but I certainly should take it, if I could get it for nothing, and try it on meadow lands.

QUESTION. "Why are cotton seed ashes so variable in composition?"

Dr. JENKINS. The reason is, because sufficient care is not taken to keep the ashes clear of sand and dirt; they are often shoveled outdoors and they are not kept clear of sand when they are shoveled up; a lot of sand shoveled up with them, and it always depends on the fire when they were burned; if they are burned hard enough, a good deal of potash is made

into a kind of glass; that potash would be absolutely of no use to the farm.

Chairman SEELEY. The question-box is closed for the present, and we now listen to singing by the Schubert quartet.

Chairman SEELEY. When I was a schoolboy I went to school only in the winter time—I did not have any time to study botany. I didn't think it was of any use to study botany, not a bit. I didn't suppose farmers had any use for botany. And I have thought a great many times that if there was anything that the farmer didn't know much about that he ought to know about, and had an opportunity to know about, it was some of the things he saw every day of his life. Now we are going to have something of that kind presented here this evening by Professor Sturgis, who has consented to talk to us on botany.

THE STUDY OF BOTANY.

BY DR. W. C. STURGIS, NEW HAVEN.

Mr. Chairman, Ladies and Gentlemen: When, some weeks ago, it was suggested to me by the Secretary of the State Board of Agriculture that, as one of the appointed speakers at this annual meeting, I should take for my subject the Study of Botany, I was somewhat at a loss how to proceed. For the scientific aspects of the subject are too broad and far-reaching to admit of even the most cursory treatment within the limits of time assigned to me, and, even if the reverse were true, the technical language in which the results of modern botanical research are expressed would render a summary of those results uninteresting, if not unintelligible, to other than an audience of scientists. On the other hand, I doubted whether people would consider it worth while to trouble themselves to attend a lecture on a subject which, in the popular mind, is quite unworthy of the attention of serious people, and, like golf, is regarded as a mild form of recreation, suited to middle-aged ladies and gentlemen of sedentary habits. No one surely would *study* botany whose intelligence

was fit for any less trivial and impractical pursuit. That such a conception of the relative importance of the study of plant life does prevail is abundantly shown by the strange fact that in at least two of our leading eastern universities there is no professor of botany, while the sister science, zoölogy, flourishes under liberal patronage. This inexplicable neglect of one branch, and that not the least important, of natural science, has its root in a widespread misunderstanding of the meaning of botany. If I were to ask you what you understood a botanist to be, probably the majority of you would respond that he was a man who spent his time in collecting flowers, picking them to pieces, and tagging them with unintelligible Latin names. And it must be confessed that such would be a fairly logical definition on the part of one who knows only the botany of a past generation.

For fifty years ago, in this country at least, the object of most botanical study was little more than the collection of specimens, the discovery of new species, and their arrangement in a more or less artificial classification. To describe and name a new species was the highest aim of the average botanist. Here and there a master mind, like that of Asa Gray of Harvard, saw in plants something more than a number of objects to be classified like postage stamps, but such men were few and far between. It is small wonder that, in the minds of the majority of people, the botanist was an object of sympathy as an unfortunate individual of ill-balance, or possibly deficient intellect, who could find nothing better to do than pick flowers to pieces. One does not have to go even fifty years back to find this condition. I recall with great distinctness an incident connected with my early botanical career. A fellow botanist, having spent the day collecting plants, overstayed the limit of his time and suddenly discovered that the train which he was to take was almost due. As the train drew up to the station, my friend appeared, running as if for his life, his hat in one hand, a trowel in the other, his clothing in the disarray incident to a hurried parting from briars, and his tin collecting-box flapping wildly from his shoulder and vomiting its botanical contents. On reaching the station, breathless, and attempting to board the train, he was promptly arrested under the firm conviction on the part of the watchful authorities that he was a certain lunatic who was known to

have escaped the preceding day from the neighboring State asylum. They could hardly be appeased by the assurance of a bystander that it was merely an aggravated case of *botany*.

The botanical teaching of twenty years ago did little to dispel the idea of triviality attaching to the study of botany. In a paper upon this subject, written in 1876, one of our leading professors of botany thus describes the situation: "In all our colleges, whether botany is compulsory or elective, the first step is to recognize the organs of flowering plants and to learn their names. The student is requested to provide himself with a manual, a number of flowers is then placed in his hands, and he is required, if we may be allowed the expression, to 'go through them.' Where the botanical chair is combined with those of zoölogy, chemistry, and the modern languages, the 'going through' consists in tracking a flower, just as though it were a thief or a woodchuck, to its hiding-place in the manual, by means of a key. The great fact is never lost sight of that the end and aim of all botanical instruction is, at the end of a year's study, to be able to take one's manual and, with a certain degree of facility, find the names of common flowering plants. What is the result? The good students who have, under the circumstances, made the best use of their time, are able to analyze simple flowering plants with tolerable ease; and those who have not studied so faithfully are perhaps able to explain to a cruelly skeptical father that a rose bush is very much like an apple tree, or to compare notes with Emily, who has just returned from Miss Smith's Institution for Young Ladies, and, after some months' study, is not quite sure whether the calyx is inside or outside the petals."

Although this statement of the case, ludicrous as it is, was quite true when it was written, it would not have been true ten years later. Aroused by the stimulating example of foreign investigators, the rising generation of American botanists began to awake to the fact that plants were not merely specimens to be named, dried and classified; that they offered exceptional opportunities for the study of vital phenomena common to all organized beings, such as assimilation, growth, and reproduction; that the study of vegetable physiology might be quite as conducive to real progress in our all-important knowledge of the life processes of organisms as the study of animal physiology had been; and that plants, not-

withstanding their comparative inability to move from one place to another, yet maintain a successful struggle for existence, either by adapting themselves to their surroundings by changes of structure, or, by means of devices unsurpassed in variety and efficiency, securing for their offspring a more congenial environment. With the substitution of the compound microscope for the magnifying glass in the study of botany, not only has a world of minute vegetable organisms come to light, but the higher plants have been shown to be adapted, in an equal degree with animals, to the study of those almost invisible yet profoundly significant phenomena accompanying the process of individual reproduction. Earth, air, and water are found to be teeming with microscopic plants, at once the bane and the blessing of mankind; while the higher plants themselves become the prey of the lower, and the consequent ills, formerly ascribed to agencies beyond human control, are properly brought within the scope of the study of botany. Thus, year by year, almost month by month, has the field in which the botanist labors been widened, until its limits have become practically invisible. The field which, even twenty years ago, could be fairly well occupied by one man, is to-day too large for a score. It has been divided and sub-divided and each sub-division has its group of workers. In no other science is the modern tendency toward specialization more marked than in botany. To-day the name botanist is useless for purposes of discrimination. We are sure that the man to whom it is applied is a student of plants rather than of animals, but we have no idea whether he is engaged in examining a drop of water for typhoid germs or is superintending the management of ten thousand acres of forest. As if suffering the consequences of his predecessors' passion for naming things, he is nowadays being called names himself. He is no longer a botanist. He is a systematist, a physiologist, a pathologist, a forester, or, worse and worse, an ecologist, a mycologist, or an agrostologist. One almost imagines that he will soon be so minutely sub-divided as to be deprived of personality.

When we understand that each one of these names stands for a distinct and well-recognized department of botanical study, and still more, when one attempts to read an article in a modern botanical magazine and finds it unintelligible, owing to the abundant use of terms freshly coined for the oc-

casion, we cease to be surprised that the mere suggestion of studying botany frightens people now in quite as great a degree as it excited their scorn fifty years ago. It may be noted, however, that both the fear and the scorn, even though natural, are based on a misconception. The older method of studying botany was of use. It did serve to make known the existing forms of plants and to arrange them in an orderly sequence. Its work was a stepping-stone leading to further advance. It was futile only when conducted as an end rather than a means. On the other hand, the extremely technical work of the modern botanical specialist, notwithstanding his long and peculiar name and the narrow range of his special field, is of increasing value, not only to a narrow circle of scientists, but to the community at large, to medicine, to chemistry and related sciences, to manufactures, and, above all, to agriculture.

But between the two extremes of what we may call the "stamp-collecting" type of botany, on the one hand, and the technical specialized type on the other, there is a vast field which presents an opportunity to every real lover of plants, however limited his time or his natural capacity, to come into still more friendly, because more intimate, relations with plants; to acquire a knowledge of them vastly more broadening to the mind than the limited field of the specialist; to derive a pleasure unsurpassed in its keenness — the pleasure of discovery; and, above all, to develop that peculiar sense, innate in every child, but too often destroyed later by mere neglect — I mean the *observing* sense, the power to *see*. I wish to return in a moment to a somewhat more detailed consideration of this point, but now I want to emphasize another one. The man, woman, or child who desires to know plants must love them. This is so trite and self-evident a statement that it hardly seems worth while to make it. It is a principle which is well recognized in our dealings with the lower animals, somewhat less so in our relations to men, but often not at all when it is a question of plants. I am at a loss to account for this peculiar lack of consistency. The average farmer appears to regard the plants upon which he bestows his care and which yield him proportionate returns merely as so much stock in trade. He must not neglect or abuse them, because thereby his pocket suffers; he calculates his returns in dollars

and cents, and in nothing else; his plants are his slaves rather than his friends; you dilate upon the pleasure to be derived from a flower garden within easy reach of his door, and the reply is that "flowers don't *pay*." It is a source of constant wonder to me, such being the case, not that Mr. Gold's list of "abandoned farms" in Connecticut is so long a one, but that so many farmers do succeed in making a living out of their crops. There would be no abandoned farms if our sons and daughters were born and reared among surroundings indicative of a love for plants. Under such conditions sympathetic relationships become established. The farmer studies the requirements of his plants; he watches them day by day, alert to discover their needs or to guard them against a host of enemies; the delight which he takes in them is something quite apart from the prospect of a well-lined pocketbook; and when the frosts of winter summon them to sleep and rest, he feels a touch of sadness akin to that which overtakes him as he watches the passing away of a generation of loved companions. To such loving care his plants seem to give almost a conscious response, so unstinted and joyous does it appear, and his neighbors wonder why it is that his are the crops which never seem to fail. There is a savor of elemental truth about the old German folk-lore which associated with every flower and plant its own peculiar and personal spirit, resentful of neglect, but responding gladly to sympathy and attention. We would do well to train ourselves and our children in so benignant a view of nature.

On the other hand, let a farmer's boy be given to understand, or have reason to infer, that his father is a farmer because of the money he can get out of it, and when the time comes for him to decide upon his future and he is told that the farm pays, his obvious reply is either that appearances are deceptive or that other things pay better. If money is to be the single standard of value in farm life, the boy's decision to have done with it is, in most instances, wise and laudable. But if, as I believe, a country life, more than any other, arouses and ministers to man's higher nature, to his inborn love of beauty, harmony, and order, then surely the boy who willingly turns his back on it and follows the beckoning hand of Pleasure's caricature, only to lose himself and his ideals in

the filth and turmoil of the city streets, is something worse than a fool.

It is not the farmer only who exemplifies the response which nature gives to loving care. A friend of mine, a woman of great intelligence, showed me last summer a poor withered little specimen of a rubber plant. After a winter in the house it had been set out in a full blaze of sunshine, and it had been given no water for several days. Upon my commenting on the condition of the plant with its blistered leaves and caked potful of earth, my friend said, "Yes, my house-plants never succeed, so I always throw them away in the spring, and get fresh ones in the autumn." Had she reversed the statement it would have been more true. Yet I suppose the idea of letting her baby die from neglect would be abhorrent to her. There is another lady whom I know, she is very old and seldom leaves her chair, but her window-sill is filled with flower pots and old bottles, and in every one a plant. She will root a cutting that has come to her in a half-withered bunch of flowers; everything that she touches grows; I really believe that if she were to stick a lead pencil into an inch of damp sand it would put out roots and ultimately produce a crop of love letters.

Another acquaintance of mine, a lawyer, looking out with me over a wooded expanse of country not many months ago, after a long silence said, as if to himself, "If ever I marry for anything but love, it will be for trees." He was no botanist, I doubt if he knew an oak from a chestnut, but had he been a botanist or a farmer or a forester or any other member of that happy class whose lives are passed in a close intimacy with the world of plants, he would have been a successful one.

But let us return again to this matter of the faculty of observation which I touched upon a moment ago, for that is almost the main point which I want to bring out of this rather wandering discussion. I have no intention or desire to induce any of you to study botany as a science. The world's visible supply of scientific botanists is fairly sufficient to meet the demand. But society is wofully "short" on people who can use their eyes to some purpose, people who can *observe*. It is to the study of plants as a means of supplying this deficiency that I am most anxious to attract you. The power of observation is not a lost art, but merely a suppressed one.

It seems to be inborn in children; it is very rarely fully developed in adults. It can be killed, or it can be kept alive. If I were asked whether it was worth the trouble of acquiring it, I should reply that, so far as added individual interest, occupation, and happiness in life are concerned, it is almost on a par with the recovery of sight by a blind man. In fact, in every stage of its progress the increasing ability to see is more like the acquisition of a new sense than the development of one already existing. To such an end the study of plants offers the keenest incentive, and the most abundant opportunity. For these living things are about us on every hand; they press upon us, demanding notice; to the beginner they offer an endless variety of forms and adaptations, each full of meaning; to increasing powers of observation they present new realms of undiscovered country; while to the adept, provided with modern appliances whereby the limits of possible vision are increased a thousand times, an area measured by inches affords an opportunity for weeks of fascinating study.

This power of observing is not a peculiar faculty given to but few; it can be acquired and developed by anyone whose interest in plants is something more than a passing fancy or a means of money-making. A few years ago I met at Block Island a lady who had spent several summers there. She passed for a botanist, that is, she had some card-board picture frames adorned with bits of sea-weed, and two or three of the common woody, shelf-like fungi, with rural scenes sketched upon their lower surfaces. She gravely assured me that Block Island produced only ten species of flowering plants, and was much disturbed when I informed her that during the course of a short stroll the previous afternoon I had counted no less than thirty. She meant well, but her powers of observation were limited to the obvious. Again, the ability to see increases with a knowledge of what one is looking for. I remember being told once that the Yellow Fringed Orchid grew sparingly in a piece of swampy ground near New Haven. It is one of our most conspicuous and showy orchids, yet I searched for almost a whole morning without finding a specimen. I had never seen the plant, and, therefore, did not know exactly what I was looking for. I was about giving up the search when I came upon a superb specimen growing in a peculiarly conspicuous position. After

having once seen it I found a score or more of plants on ground which I had tramped over again and again during my previous search. Every naturalist could cite such strange experiences without number. I know a man whose powers of observation seem almost miraculous. He is an entomologist as well as a botanist, and has therefore trained himself to observe in more than one field. During the course of a stroll in the woods he has frequently called my attention to a small insect, for example, resting upon the trunk of a tree. I might strain my eyes in a vain effort to see it, until he went up to it and put his finger on it. Then it became plain. It was not a question of *far*-sightedness, for when he pointed it out to me I could see it as distinctly as he; it was merely his far greater *sharp*-sightedness, his more highly developed power of observation which enabled him to see what I could not without his assistance. And what was the result? Every hour of his life had an added zest. He saw the myriad forms of life all about him, he walked in a world unknown to others, he possessed an added sense, a road to pleasure barred to most of us. Who will say that such an acquisition is not worth the care and patience necessary to obtain it?

As in all forms of self-education, though perhaps in a lesser degree, the man who starts in to train himself to observe will inevitably make countless mistakes at first. But after all a wrong observation is incomparably better than none at all. The man who is afraid of making mistakes will never make anything else. I was told the other day of a tobacco grower who was convinced that he had discovered for himself the adult form of the tobacco worm. He was sure of it because he had seen the insect-in-question issue from the chrysalis of a tobacco worm. As a matter of fact, however, the insect proved to be, not a moth at all, but an ichneumon fly which had hatched from an egg deposited by its mother after the manner of her kind in the body of the tobacco worm. The young ichneumon had devoured the unhappy pupa and, when fully grown, had issued from the chrysalis of its host. Our friend's observation was correct, but, for want of several similar observations, he had reached a mistaken conclusion. Yet there was hope for him. He would continue to observe. Presently he would see a large moth emerge from a chrysalis exactly like the one he had seen before. Puzzled by such

contradictory evidence, his interest would be aroused; he would watch other chrysalids, and finally he would discover the truth that the adult of the tobacco worm is the large moth, and the ichneumon a parasite. Had he read this in a book he would have forgotten it the next day. Having discovered the fact himself, it is indelibly impressed on his mind. Notwithstanding his first error, he is vastly better off mentally than his neighbor who does not trouble himself to inquire whether the statement, once a tobacco worm always a tobacco worm, is true or not.

So let us make up our minds that there is a puppy-stage in the training of the faculty of observation, and that we must go through it and bear with it, confident that with patience our eyes will open and we shall see with the mind as well as with the eye.

Bear in mind also that the great naturalists have not been scientists in the modern sense, that is, they have not been specialists. They have been self-trained observers; they have been men who made countless mistakes, just such mistakes as you and I would make; but their fame rests upon the fact that they reinforced their observations with infinite patience, until the truth was attained in such a degree that the most profoundly significant generalizations were established.

Charles Darwin was not a botanist, he was not a zoölogist nor a geologist. He was nothing more nor less than an infinitely careful and patient observer. He was not skilled in the use of the microscope. Most of what he saw, he saw with his unaided eyes, and recorded. Yet it is safe to say that the conclusions which he derived from his observations upon living things, whether plants or animals, have influenced man's conceptions of organic life and the forces which environ, direct, and modify it to an extent unequaled by those of any other human being. The very magnitude of the conclusions blind us to the first steps, often so apparently trivial, by which they were reached. Yet the latter are within the capacity of any man with eyes to see. The almost imperceptible motions of a tendril; the hidden, slow, laborious course of earth worms in the soil; the seemingly casual visits of insects to flowers; these and countless other features of life which the average man passes over as beneath his notice were to Darwin instinct with meaning, and the results have proved that science

is in a great measure founded upon the observation of common things, and upon conclusions deducible therefrom by common means.

One day, toward the close of the year 1789, the warden of Merton College, Oxford, in conversation with a young man regarding a book which had recently been published in England, remarked, "Your uncle has sent into the world a publication with nothing to call attention to it but an advertisement or two in the papers; but, depend upon it, the time will come when very few who buy books will be without it." The uncle referred to was a country parson living, where his fathers had lived, in an obscure English village. The book which he had written consisted of nothing but a running commentary upon what he saw about him in the woods and fields of his native village; yet, the prophecy concerning it has come true, and Gilbert White's "Natural History of Selborne" has been for a hundred years, and, doubtless, will remain, one of the most shrewd and delightful commentaries upon nature in the English language. It is one of the very few books worthy of a place beside Walton's "Complete Angler."

The idea that I wish to enforce from these two examples that I have cited is, that in order to derive the utmost individual pleasure and profit from the study of botany or of nature as a whole, one need not be a scientist in the strict sense of the word. The pages of Nature's great book of life stand open to all her lovers who have eyes to see the evident, a desire to see more than appears merely on the surface, and a mind to draw conclusions from the facts observed. It is this last quality which, combined with what Burroughs calls "the detective eye," has, in the past, led to more than one real and permanent contribution to science on the part of those who were utterly unconscious of the fact that they saw what others could not, or, at least, had not. I am well aware of the difficulty which the amateur botanist must always find in determining whether or not his observations are of any scientific value; I know that botanical literature is filled with commonplace trivialities about plants, to which one is inclined to apply the famous remark of the English member of Parliament regarding an opponent's speech, that "What was new in it was not true, and what was true was not new." But those who commit such mistakes are usually persons who are

unwilling to pass for amateurs in any field of knowledge, or who have a morbid hunger for the publicity of print. They are like gossips listening at Nature's outer door, catching here and there a whisper of her voice, guessing at her secrets, and then publishing them abroad with injudicious comments of their own. The true lover of Nature accepts her invitation to enter, he wins her confidence slowly, he is not intrusive, and, at last, after he has guarded jealously her little secrets, she tells him one which, for her sake and for the sake of truth, he must tell aloud in the language in which it was told to him.

How, then, shall we begin the study of botany, that is, the training of the faculty of observing plants in their varied forms, and in their relations to things about them.

It is, perhaps, easier to say how *not* to begin, and to warn the beginner at the outset against the prevailing idea that he must have a book to start with, preferably one dealing exclusively with the names of plants. For, after all, names are merely a convenience to enable one to designate objects with which he is already acquainted.

I do not wish to decry the use of all kinds of books, and in all cases, but there are so many features of plant life which can be learned without their aid, and the joy of discovering a fact for one's self is so intense, that to learn it out of a book first, and go to nature merely in order to verify it, seems to me to rob the study of plants of half its pleasure. Suppose, then, that we have no books, and are bent on seeing something for ourselves. Wherever we go in woods or fields, the first thing that strikes us is the enormous diversity of plants. To our untrained eyes hardly any two are alike. Some tower up above our heads, 40, 50, or 100 feet, and, high in air, "hang all their leafy banners out" to the sun and the breezes. At our feet are delicate ferns, trailing mosses, lowly flowers raised only an inch or two above the ground. Between these two extremes are hosts of other plants, differing each from each, not in size only, but in habit, in form, in color, in almost every detail, yet all crowding one another and struggling for room, for sunshine and fresh air. And, as we soon discover, this manifold diversity of form and habits extends to all the visible parts of this plant world. Here is an oak leaf with broad, expanded surface, there a pine leaf so extremely narrow that unconsciously we call it a "needle." On this plant each leaf

is single and distinct, on that they are composed of parts radiating from a center or arranged on both sides of a common axis. No two leaves are alike, and if we are fortunate we may come across a plant with no leaves at all, but consisting only of a flattened, green stem, looking, for all the world, like a string of green flap-jacks. Leaving the woods we come presently to an open wet meadow. Here everything is different again. Instead of the trees we now find only a few shrubs or bushes, and these mainly confined to the dryer places around the border of the meadow. The central area is occupied entirely by tall grasses or grass-like plants quite unlike anything that we saw in the woods. This astonishing variety is the first striking feature of plants. We have of course noticed it before, but, perhaps, we have not before realized how this principle of diversity of form and habit fairly permeates the whole world of plants. Let us further impress it upon our minds by drawing the outlines of as many different forms of leaves as we can find on different specimens of one kind of tree, the oaks, for example.

Here is an oak leaf which we lay flat on a piece of paper and trace its outline. Our drawing looks like an island with deep bays and sharp promontories. Another leaf from a neighboring oak shows the bays shallow and the promontories rounded. Still another has no bays at all, but shows almost the outline of a willow leaf. Yet all of the trees from which we gathered these leaves are oaks, for all of them bore acorns. Now, if we should continue the collection of drawings thus begun, confining ourselves entirely to the oaks, and should then attempt to divide our oaks up into groups according to the outline of the leaves, we should discover some interesting facts; first, that while all the leaves from one tree had a definite general outline, no two were exactly alike; secondly, that they could be arranged roughly into groups, that is, that leaves with an even outline never occurred on trees bearing leaves with an outline deeply indented; and thirdly, that very many of the leaves would fit into no one group, but seemed to be intermediate. From this we might reach the very just conclusion that the oaks form a peculiarly mixed-up family of plants, and that they readily *hybridize*, as the gardeners say. If we cared to examine and compare the acorns from these trees as well as the leaves, we might find our conclusion con-

firmed. But at any rate we should have discovered that the tendency to variation and diversity is not confined to societies of plants occupying different areas, but is seen in a single society of plants occupying a single definite area, and even in the various parts of a single plant. In other words, the plants found growing on the wooded hillside are different from those found in the wet meadow at its base; the plants in the meadow are of many different kinds; and, if we compare the leaves and flowers of several of the meadow plants of the same kind, we find that, while they are apparently alike, they still exhibit many small differences in shape, size, and so on.

As this diversity in plant life is the first feature to attract the notice of the observer, so the possible causes of it cannot fail to arouse his curiosity. Is it possible that every one of these different forms was created originally in just the form which we see to-day? Surely not. We know that the skillful horticulturist can seize upon the most useful features of two different plants and combine them in one new plant, and a little care in observing will show us that the same process is constantly going on in nature. We must conclude that plants are more or less plastic organisms, constantly undergoing slow changes in form and structure to adapt them better to their changing surroundings. It was on the basis of observations along this line that Darwin founded his famous hypothesis of evolution, and its controlling factor — natural selection.

It is for the expert to determine all of the factors which share in producing that diversity of plant life which is one of its most striking features, but some of them are evident even to the beginner. Thus, for example, he can see at a glance that the vegetation of a dry hillside is different from that of a wet meadow, and that this rule holds good of all hills and meadows; he can go further and ascertain that the lowly plants in his wet meadow are unlike the same character of plants in a neighboring meadow which his grandfather drained and reclaimed. He can make certain of this fact by making a collection of the plants occurring in the one, and comparing the different forms with those of a similar collection from the other. To do this very satisfactorily it is not necessary or even advisable that he try to collect every kind of plant in each locality, nor is it essential for him to know their names.

All that he wants to show is that the prominent, prevailing forms in the one meadow are different from those in the other. Comparing this and that, the idea strikes him that the water supply is a powerful factor in determining the location of plants and in modifying their forms. If he has a chance to visit or see pictures of the dry regions of the southwest, he will see a striking confirmation of his ideas in the form of the prevailing plants there. In that arid region many of the plants have dispensed with leaves altogether, and their stems have become green in order to discharge the functions of leaves, and enormously swollen in order to store up the scanty supply of water from the soil.

If our friend lives in a mountainous neighborhood he has, of course, been struck with the changing appearance of the vegetation as he ascends. The kinds of plants growing near the summit of the mountain are different from those at the foot. Of course, some of them are the same, but let him gather, say an anemone, in the valley, and compare it with another anemone growing far up on the mountain. They are both anemones, but how very different in form and habit! Now, what our friend has been doing when he climbed the mountain is just what he would have been doing had he been traveling from south to north at the sea level. He has been experiencing a change of climate. He concludes that such a change, whether associated with the lapse of time or with the distance traversed, has a very profound effect in producing a manifold diversity in plant life.

Finally, we observe that the kinds of plants growing on a coarse, gravelly soil, or among rocks, are different from those growing in a heavy, clayey soil, and we find in that fact an evidence that the diversity of plant life may, in a measure, be accounted for by differences in the texture of soils. If from this conclusion we are led to study the origin of soils, we shall open up still another wide field of observation and learn a great deal more about the habits and manners of our friends, the plants. We have learned now to appreciate from observation in the woods and fields the extraordinary diversity of the plant world; we have got an inkling of an idea that this diversity of form and habit and grouping may not be due to chance, but to a species of choice; that is, that there are a number of external conditions which influence the plant and

to which it adapts itself — such conditions as the water supply, the climate, and the nature of the soil.

But what is it in nature that first strikes the eye when winter gives place to spring? Anyone would reply at once that it is the growing verdure, the wonderful green mantle which is slowly drawn over the brown surface of the earth. And that exquisite color is due to the springing to life again of plants; so we reach the conclusion that one characteristic of all plants is their green color. So self-evident is that conclusion that we are rather annoyed that anyone should rate our intelligence so low as to think it necessary to remind us of it. But are we so certain? Let us take a walk, some time in June, into the wood lot and look about there with our eyes open. Here is a peculiar thing — a cluster of waxy-white objects, long-stalked, with nodding heads. How like a clump of pipes planted bowl uppermost. Are they plants? They must be either plants or animals. Examine the nodding heads. Surely they must be flowers. Yes, these are plants, but they are nothing but root, stalk, and flowers; even the leaves are reduced to little scales, and there isn't a vestige of green color about them anywhere. So, evidently, all plants are not green. Then look over there beside that old log. What is that curious flat-topped, stalked affair? Oh, it is nothing but a toadstool. Very true, but is it plant or animal? Well, we are not sure, but since it must be one or the other, we are rather inclined to call it a plant. And we are quite right, yet it isn't green.

Then we shall have to give up the idea, of whose truth we were so absolutely certain, that a green color is a universal characteristic of plants; in fact, by and by we shall discover that the number of plants which are not green is quite as great as the number of those that are; and possibly greater, and when we come to learn how plants feed we shall find that this fact about the color of plants is one of enormous significance.

Or, again, we have perhaps run across some well-informed individual who has told us that while most plants produce flowers, some do not, and that among the latter are many of our common shade trees. From the height of our superior powers of observation we have possibly informed our friend that he is quite mistaken about the shade trees, and that all plants produce flowers.

Let us test the value of our generalization. Suppose some fine day we go into the woods with the intention of gathering a bunch of fern flowers. We look for them in vain, and it suddenly occurs to us that we have never happened to run across such a thing, and the more we look, the more doubtful we become of the truth of our previous statement, for we find no flowers on the ferns, or the mosses, or the seaweeds, or the toadstools, and if only we could see well enough, as we will some day by the help of a microscope, we should discover a great host of plants, indeed the majority of the plant world, that produce no flowers whatever. Here again we have come across a fact of such value that upon it is based the primary division of the whole vegetable kingdom into flowering and non-flowering plants. It is true that as regards size, in this climate at least, the non-flowering plants are comparatively insignificant. In the tropics we find huge tree-like forms, but as a general thing the non-flowering plants are small, often microscopic, though in number they far exceed the flowering plants.

But, notwithstanding all that we can learn by observation about the life and habits of plants, form and color are at first, and perhaps long remain, their most attractive features. A more or less unintelligent love of flowers is, therefore, almost universal; there are more flower lovers in the world than plant lovers. I speak of "an unintelligent love of flowers," advisedly, meaning by that expression the common attitude of mind which sees and values only the external characters of a flower, and completely overlooks its true meaning and purpose. Thus to one person a flower is of value only if it has an attractive color or a sweet odor; another passes over every flower to which he cannot give a name; a third conceives of flowers as having only one reason for existence, viz.: to be picked. A hillside covered with pink Azalea, or a clump of the Showy Ladies' Slipper, is attractive to such a person, but his instinct is at once to gather an armful to take home and put in a vase. Nature is lavish, and where she provides a sufficient abundance of a certain flower, the desire to gather a few in order to add to the beauty and cheerful aspect of the home is an entirely legitimate one; but when, as is often the case, the so-called lover of flowers proceeds on the theory that there is no good flower but a picked flower, or, worse still,

measures the value of a flower, for picking purposes, by its rarity, then surely that person's love of flowers is *dignified* by being called merely unintelligent. It verges upon vicious thievishness. A fourth person exhibits his love for flowers by showing with pride a number of sheets of paper, each bearing a pressed and discolored specimen, or a number of such arranged in ghastly groups, simulating life. As well might Mark Anthony, were he living now, attest his love for Cleopatra by exhibiting her nicely dried and preserved mummy. A good herbarium, showing every essential part of the plants contained in it, with notes on the locality, date of gathering, etc., forms one of the most indispensable adjuncts to the study of botany. But a collection of pressed flowers, separated from the plants which bore them, both actually and in the mind of the collector, and unaccompanied by any notes, is an evidence only of an incomplete conception of the meaning of flowers. The love of flowers which, is confined to such methods of expression is essentially lacking in intelligence. How, then, can the beginner, whose interest is keen, learn something of real value from the observation of flowers? There are so many ways in which this can be done that we can only touch on a few of them. We may start a collection of flowering plants which will, when complete, show the striking differences in the flora of two neighboring localities where the external conditions are different. Such a collection should contain at least two specimens of every plant collected, and these specimens should, if possible, be pressed and dried intact. If the plant is too large, the essential parts alone should be shown — the flowering portion complete, enough of the stem to show the character and arrangement of the leaves, the root system whenever practicable, and the fruit or seeds. For this purpose it is not essential at first to know the names of the plants collected. That will come later, when we want to compare notes with other observers. Such a collection, including notes on the locality, habit of the plant, whether herb, shrub, or tree, and dates of flowering and of fruiting; limited to a diversified area, say of a few square miles; and showing, in separate covers, the characteristic plants of the low, wet woods, the wooded hillside, the swamp, the dry upland pasture, the sandy plain, and the roadside, will have a permanent value of extreme scientific importance, besides

giving the collector a vast amount of practical information regarding the connection between plants and their surroundings.

Or, we may be interested in the structure and arrangement of flowers and we presently find that here again there is an ordered diversity. One plant produces double flowers, another single; in this the flower is symmetrical, in that it is irregular, sometimes almost like a face with jaws that open and shut; here again are flowers borne singly, there a group of plants with flowers in flat, conical, or whorled clusters. We pick a white-weed blossom and upon close examination find that what we have always supposed to be a single flower with a yellow center and white petals consists really of a multitude of little flowers, all arranged on a flat disk, the outer ones provided with a long, white, strap-shaped organ. It is a compound flower, and if we look about for others, especially in the autumn, we find that all the asters, goldenrods, sunflowers, and a number of others have flowers of this type. We may even attempt a collection of all the plants in our neighborhood which have compound flowers. We shall be surprised by their number and variety.

But, after all, we have seen nothing yet of that feature which produces the deepest interest in flowers and explains their very existence, to say nothing of their varied forms, colors, and odors. For the most general definition of a flower is that part of a plant which is concerned in the production of seeds. It is the plant's expression of its desire for reproduction. To this end it seems to have bent all its energies. With marvelous ingenuity, nature has slowly brought about changes in the forms of flowers by which this supreme purpose of their lives may be more and more efficiently accomplished. Darwin's observation of plants led him rightly to conclude that "Nature abhors perpetual self-fertilization." To guard against the disastrous results of inbreeding, plants have developed special adaptations unsurpassed in variety and efficiency by any other organisms. The study of these adaptations is yet in its infancy; it is a fascinating field, open to all who have eyes to see.

Here is a field of corn, the tassels waving on the highest stalks; below, the hidden ears with their plumes of silk. Tassel, and ear with its silk — these are the corn flowers, male

above, female below. The tassels have no odor, the flowers composing them are small and inconspicuous, they secrete no nectar, few if any insects visit them. But shake the tassel. What a cloud of yellow dust arises! Catch it in your hand. It is a fine, almost impalpable yellow powder. Sprinkle it on the silk of the ear below and see how it sticks. You may now cover as closely as possible every ear on the plant, and when you come to look, in the autumn, you find only one full ear, and that the one whose silk was touched by that wonderful dust, unless, before you knew it, the dust had reached others. But how could it have done so? A breeze sweeps over that tasseled corn and gathers its load of pollen dust. It takes a sharp eye to see it, but moisten a piece of glass with the thinnest film of glycerine and hold it upright in the wind's path. There is the dust now, in a delicate layer all over the glass. The corn plant has adapted itself to the wind's will, and the wind has become its servant to carry the pollen of one plant to the unborn ear of another. You will find many other such plants; the pines and spruces of our forests, which sometimes shed their pollen in such abundance that the air is full of it; the birches, the oaks, and the hickories; the grasses of our meadows — these and many others call upon the wind. An easily-tired, wasteful agent they find him, and they have learned to make their pollen light and to produce it in enormous quantities, so that it may be carried far, and that some grains may reach their destination, though millions perish on the way.

But Nature dislikes such waste; therefore many flowers have secured an agent far more careful than the wind. We noted the almost complete absence of insects about the corn tassels. But look at this pear tree in full bloom. It is fairly alive and humming with bees and other insects, tumbling over one another in their eagerness to reach the blossoms. Examine a single blossom. Here is a circle of little stalks each bearing a yellow sac on its tip; within this circle is a cluster of delicate clubs with sticky tips; deep down in the very center of the flower is the store of nectar. The flower is showy, it has a sweet odor, it secretes nectar. It is this nectar which the bee wants, and in his efforts to get it he brushes over the yellow sacs of pollen, leaving as he does so, on the sticky clubs in the center, some of the pollen which has clung to his body

from the last pear blossom which he visited. Cut the flower open and you find that these clubs form the prolonged tip of the ovary. Through these tips the pollen reaches the ovary, fertilizes the enclosed ovules, and seeds produced by cross-pollination are the result. In order to attract insects and thus to secure pollination and to guard against inbreeding, flowers have developed nectar, they have devised color and odor to serve as guides, they have made their colors into finger-posts pointing the way to the stores of nectar, and finally, having done their best to render themselves attractive, they have so disposed their pollen sacs and ovaries that their insect visitors cannot but come in contact with them. It has been no easy task. They have hidden their nectar at the bottom of long tubes, they have twisted themselves into all sorts of odd shapes, they have placed their pollen sacs on the ends of catapults and so arranged them that the insect himself releases the spring and receives the shower of pollen, they have devised traps and doors which the insect must open before he can reach the nectar and, in so doing, effect pollination, and they have provided their pollen grains with rough or spiny surfaces, or rolled them up into sticky balls so that they may more readily cling to the bodies of insects. Having done all this, they can afford to decrease their production of pollen, often to the contents of a single minute sac, and utilize their energies in more valuable ways.

The long and varied story of the manner in which flowers and insects have adapted themselves in response to each other's need forms the most fascinating chapter in Nature's book of marvels. Here, as in so many other places, the book lies open. Much study of the insect visitors of flowers remains to be done. Much can be done, even by one who is ignorant of the name of a single flower or insect. Armed with an insect net and a wide-mouthed bottle containing a small lump of cyanide of potash covered with a disk of cork, he can watch a clump of flowers of one kind. Hovering about them and lighting upon them he will see numbers of insects, in some cases apparently all of one kind, in others evidently of many different kinds. Having collected, by means of his net and bottle, all of the kinds which he sees, let him gather a good specimen of the plant, press it carefully and store away together, for future reference, both plant and insects. He

may not have acquired, at the end of the season, the name of a single plant or insect, but he will have secured material for a study of the relations between certain plants and their insect visitors which he can utilize later when he has acquired their names, and which many a scientist would give a great deal to possess.

A second line along which plants have been slowly working out their life problems is the dispersion of their seeds, the attempt to secure for their progeny the best and freest opportunity for development. It is evident that if the hundreds of seeds produced by a plant were compelled to germinate and develop in the immediate neighborhood of the parent, the struggle for existence would be so great that very few of the young plants would survive. As a matter of fact these are exactly the conditions under which most plants, such as oaks, hickories, and many other deciduous forest trees, are obliged to live, and this is nature's method of weeding out the weaker individuals and giving the remaining stronger ones the best chance possible.

Many plants, however, have devised or utilized certain structures for the purpose of dispersing their seeds. Some seeds and fruits are provided with wings rendering them light and easily carried by the wind; such are the seeds of the pines, maples, and elms. Others, like the dandelion, thistle, and milkweed, utilize for this purpose the tufts of hairs or down borne on one end of the seed. Doubtless many of you have been exasperated to find, after a walk, that your clothing is covered with seeds of burdock and other weeds, veritable "stick-tights." Possibly you would be less annoyed if you realized that your friends, the plants, had merely taken this method of utilizing your powers of locomotion in their own behalf. Many animals, particularly sheep, are thus impressed into the service of plants and serve to disperse seeds far and wide. The surface of such seeds is covered with barbs, hooks, claws, or other devices, by means of which they cling to passing objects, and are thus dispersed. Some seeds, like those of the mistletoe, are sticky and so are carried on the feet of birds; others are enclosed in succulent and often highly colored berries or other fruits which are greedily eaten by birds, insuring in this way the dispersion of the hard, bony seeds. In the case of the cress and flax, the seeds are covered with a gelatin-

ous coating which remains hard so long as the seed is on dry soil unfavorable to the growth of the plant, but which swells up in the presence of moisture, and thus serves to fix the seed in just the locality best suited to it. Some seeds may be carried long distances by water. Thus the cocoanut, heavy in itself and not easily transported, has a buoyant, impervious husk which enables it to be carried long distances on rivers or on the sea. Again, some plants, like the common balsam of our gardens and the related jewel weeds, the violet, the wistaria, and some garden beans, bear their seeds in pods, which explode when ripe and scatter the seeds with considerable violence in all directions.

These are some of the methods by which seeds are dispersed. A careful study of them is replete with fascination, and a collection of seeds illustrative of this feature of plant life is easily made and forms one of the most interesting records of the ingenuity of plants.

Now winter approaches. The plants which have become so familiar to us shed their leaves; there are no more blossoms; the insects have retired into winter quarters. All nature seems dead or asleep. But, strangely enough, it is the very season for the study of some features of plant life which have escaped our notice altogether during the summer when there was so much else to be seen. For now, in this dead season, we enter nature's "life class," provided for studies of the nude. The trees have laid aside their garments, and what varied characters they now present in the shape and plan of their bare branches! We have never before noticed what an individual character every tree has, and how much more marked this is in winter than in summer. See how varied their expressions are. Here is a shagbark hickory; how uncompromising and stiff it is in outline and branching! How different from the easy, graceful habit of the elm. There is a Lombardy poplar, a grenadier among the trees, always on guard. The idea of rugged sternness which the oak expresses is as far removed as possible from the gentle yielding character of the willow. As our power of observation becomes trained we learn to note similar differences in even very nearly related trees; the shagbark and the pignut hickory, for example, or the plum and the peach. There are not a few nurserymen who can at a glance distinguish between

different varieties of pear or apple trees by differences in their manner of branching.

Learn to draw the winter aspects of trees, sketching in their outlines, the main branches, and the general habit of the smaller ones. It takes an expert to draw trees in full leaf, but with a little practice even the beginner can sketch the essential features of a tree in winter. And here let me enforce the value of drawing as a training of the eye. Nothing really can take its place. Not only is it a valuable training in observation, but it is an indispensable aid to memory. "But," someone says, "I can't draw; I never could." Of course you can't at first. No one but a genius can. The difficulty with most people is that they attempt too much at the outset. Begin with the simplest things—the tracing of the outlines of leaves, the veining of leaves, a flower cut open and showing its different parts, the aspect of different trees in winter. Your first attempts will be crude, you will never, perhaps, produce artistic effects; but, with patience, you will succeed in putting on paper what impresses you; and what you draw, be it ever so simple, you will remember. Two years ago I spent a fortnight with a genuine naturalist near London. His knowledge of nature was very broad. For years he had been in the habit of bringing home and sketching every sort of natural object which he met with in his walks—a peculiarly shaped leaf, a rare flower, some odd form of insect, a bit of lichen-covered rock. He showed me a score or more of sketch-books filled with drawings, rough and commonplace at first, but showing a gradual increase in beauty and in truth to nature, until the recent ones were exquisite bits of drawing worthy of a consummate artist. To this constant practice of drawing whatever attracted his attention I attributed, in great measure, my friend's extraordinary knowledge of outdoor life. A soft pencil, a sketch-book, and a note-book should be the constant companions of anyone who desires to know plants and to train himself in observing them.

But to return to our winter class in nature study. In drawing trees, bear in mind that you want your sketch to express those features which give to the tree its individuality. Its height as compared with its greatest width; the general shape of the head, whether round, cylindrical, or vase-shaped; the comparative distance from the ground, of the primary

branches; the angle at which the branches are given off; the habit of the limbs and smaller branches, whether erect or drooping — these are the essential features to be emphasized. Following some such course, it will not be long before we have learned to appreciate the varying characters of trees and to distinguish them, the one from the other.

Now, too, is the time for the study of buds, bearing in mind that a bud is a young branch and that it is always placed in the angle which the fallen leaf made with the stem. Note the relative position of the buds on the stem; this will give you a key to the method of branching. Learn to distinguish between leaf buds and fruit buds, in the fruit trees, for example, and to trace out the history of a branch from the position of the buds and the scars of fallen leaves and fruit. Notice the ingenious ways in which buds are protected from sudden changes of temperature, this one by overlapping scales, that one by scales held together and covered with gum, still another by a lining of down or wool, and so on.

Interesting studies of the winter condition of perennial herbs may be made, especially with the aid of a small camera. The examination of a tract of weedy lawn will reveal a number of weeds so different in habit from that which they assume in summer that they are hardly recognizable as the same plants. They look as if they had laid their rosettes of basal leaves as close to the earth as possible in order to secure the protection of even the thinnest layer of snow.

One might go on indefinitely discussing the many ways in which plant life can be studied in the winter. The few hints which I have given, however, are sufficient to show that from the standpoint of the lover of plants winter is the season, not of death, but merely of sleep, and that plants may be made to talk in their sleep to minds which are prepared to listen.

Now, all of this study of plants which we have been making since the first pale touch of color in the spring made us imagine that all plants were green, through the summer with its wealth of diverse forms of plant life congregated into societies, moulded by their surroundings, exhibiting wonderful relationships to the winds, the insects, and man, struggling for room, securing, by cunning devices, the spreading broadcast of their progeny, until the first kindly touch of

winter quieted the struggle and put them all to sleep, — all this study we have made without a teacher except Nature herself, without books, and without a microscope.

Had we only a microscope now, an instrument which would enable us to see as if with 500 eyes rolled into one, what new and wonderful beauties of plant life would be opened to us! A world of plants quite as large as the one we know, if not larger; composed of forms as varied and beautiful, and presenting this added fascination that, whereas among the higher plants we must wait for months, even for years, to see the completed cycle of life, in this lower world, so rapid are the changes that sometimes within a few hours the whole life cycle is completed before our eyes. And a microscope which will magnify as high as 750 diameters can be bought nowadays for \$30. Think of it! An invisible world, a new empire, for \$30! But in order to use such an instrument effectively, and in such a way as to receive an adequate return for the money expended, practice is required, and the assistance of either a teacher or a book. And certainly by the time we have reached this point we shall be looking about for something of the kind to help out the information concerning the higher plants, which we have acquired hitherto simply by observation. For such a student of botany as I have had in mind during the course of this lecture, I should advise a book rather than a teacher. And this because one cannot, as a rule, select a teacher, while one can select a book or a library.

What kind of books, then, shall we begin with? Fortunately, the opportunity for choice is a very wide one. The past decade has witnessed an extraordinary revival of interest in nature study and there has been no lack of books published with the view of fostering this interest by presenting the salient features of plant life in a popular and yet sufficiently accurate manner.

Probably the most widely read of all such books is Mrs. Dana's "How to Know the Wild Flowers." "How to Know the Ferns" is another book by the same author, treating of only a single group of plants, and, therefore, appealing to a somewhat smaller circle of readers. Still another, dealing only with trees, is Miss Lounsbury's "A Guide to the Trees." These books, judging by the effect which they have produced on the public mind, are admirable, yet they all possess one

feature which, in my opinion, renders them not wholly suitable for the beginner. Their primary object is to enable the student to know, not plants, but the names of plants. Now, we are concerned at the outset with objects rather than with names, with functions rather than with organs. For this reason I should recommend an entirely different class of book; a book which deals primarily with the life of plants. There are many such. They should be read far more widely than they are.

In the very foremost rank I would place Professor Bailey's "Lessons with Plants." Its sub-title — "Suggestions for Seeing and Interpreting Some of the Common Forms of Vegetation" — exactly expresses what I conceive to be the value of the book. It is an octavo volume of some 500 pages, inexpensive, and written in a most attractive style; the language is simple and untechnical, yet the facts presented are such as are fundamental to any real knowledge of plants. Another useful book by the same author is "Talks A-field," a series of familiar talks upon the most striking features of plant life out of doors. For the lover of gardens and garden flowers, and for those who, while engaged in growing plants for profit, also desire to derive the highest degree of intelligent pleasure from their work, the whole set of books known as the "Garden-Craft Series" and written by Professor Bailey, is invaluable, although most of them deal rather more with the commercial than with the physical aspect of plants. Recently Professor Bailey and others connected with Cornell University have been engaged in the issue of Nature-Study Leaflets, addressed to the teachers of Natural History in the public schools of New York. These leaflets are most fascinating talks, addressed quite as much to the children as to the teachers, on all sorts of out-door objects, especially plants.

Professor Bailey has done more than any other single individual to popularize the study of botany, and no one will go far astray who begins his reading with almost any one of the works of this most prolific and stimulating writer.

An excellent little book for the beginner in the study of plant life is "The Story of the Plants" by Grant Allen. It has the advantage of being pocket-size, but it is not as profusely illustrated as books for beginners ought to be. The story is told, however, with simplicity and accuracy.

Five years ago Professor C. M. Weed published a small volume of botanical studies under the title, "Ten New England Blossoms, and Their Insect Visitors." It apparently has not received the attention it deserves. As indicated by the title, it deals primarily with the methods of pollination seen in the Willow, Trillium, Tiger-lily, and a few other flowers common in this neighborhood, but incidentally it contains a good deal of information regarding other features of plant life, all given in a most attractive form, and abundantly illustrated.

Among more pretentious books I have no hesitation in placing first "Minnesota Plant Life" by Professor Conway Macmillan. It is perhaps not quite as much the beginner's book as Bailey's "Lessons with Plants," but, in a regular course of general reading in botany, I should certainly place it second. It is true that it is based upon the Flora of a State far removed from our own, but this is immaterial since it deals with the general laws underlying and common to all living plants. It would perhaps gain in usefulness and interest if its author had not, in his desire to make the work popular in the best sense, entirely omitted all scientific names, but for a general review of the whole plant kingdom as represented in a temperate climate, together with the laws which govern it, I know of no other single book which approaches it in wealth of information, exquisite illustrations, and breadth and simplicity of treatment.

Other useful books in this connection are "Living Plants and Their Properties," by Professors Arthur and McDougal; "Plant Relations," by Professor J. M. Coulter; and "Plant Life," by Professor C. R. Barnes. These three books, especially the last named, differ from those previously mentioned, in being intended primarily for the use of teachers who are engaged in the teaching of botany in the public schools. Although perfectly intelligible to pupils between the ages of thirteen and eighteen years, they presuppose regular hours of study in a suitable laboratory and under the direction of one who knows more botany than he is trying to teach. They are books rather for the teacher than the scholar, but Professor Coulter's book in particular should arouse the interest and hold the attention of anyone who is really fond of plants.

None of the books thus far mentioned absolutely require the use of a microscope in the study of the topics considered;

in other words, none of them treat in detail of the lower, non-flowering plants. So far as I know no popular book covering this vast field of botanical study has ever been published. Many popular books include some information of a general character concerning Ferns, Mosses, Algæ, Fungi, and so on, and there are a number of books dealing in a popular manner with certain of these groups such as Mrs. Parsons' "How to Know the Ferns," and the many treatises on the edible and poisonous Fungi. But there is really nothing, in the way of a single book, which would enable the beginner, studying by himself, to get any clear idea of the whole range of non-flowering plants and their relationships. This is, of course, largely due to the fact that any such study presupposes a certain amount of practice in the use of the microscope and in microscopical methods, practice not easily acquired except under the direction of a competent teacher. We cannot, therefore, expect to advise the beginner to attempt much in this line. Two exceptions to this statement may be made, the one in favor of Ferns, one of the most varied and exquisite groups of plants in the whole vegetable kingdom; the other in favor of the higher fungi, commonly known as toadstools. I welcome especially the very recent revival of interest in this latter group, not because I regard toadstools as of much value as food, but because a search for them takes the student out into the woods and fields, because it opens his eyes and trains him to observe the humbler forms of plant life, and because it introduces him to a class of plants as different as possible from those to which he is accustomed. A general study of toadstools does not necessarily require the use of the microscope, and, now-a-days, it is made both possible and interesting by numbers of popular books.

But now I find myself in the awkward predicament of having exhausted your patience before I have begun to reach the end of my topic. I should have liked to touch upon the various uses of the higher plants; the economic importance, to the farmer, of the lower, parasitic forms; the varied beauty and absorbing interest of some of the 40,000 known species of fungi; the use of the microscope and the wonders of plant life which it reveals. I should like to have been able to speak, with the enthusiasm which I feel for it, of the added joy in life experienced by the possessor of a garden, however small,

where he can come into close contact with the soil, teeming with life which he has caused to be gathered there; where he can watch the daily miracle of sprouting seed and unfolding flower. I should like to have expressed, in language more forcible than polite, my opinion of the man, and especially the farmer, who, in planning his home, includes a nursery for children, but none for flowers; who neglects to surround and to fill his house with blossoming plants, and thus, while claiming to have at heart his own and his children's highest welfare, deliberately closes one of the broadest and most obvious avenues to pleasure and satisfaction; who blights his farm with commercialism, and then rails at his boys because they forsake it and him at the first opportunity.

Formerly the New England farmer represented the strength and vigor of the nation. He loved his farm and his freedom. He was beholden to no man for his living. In the quiet of his home he saw his children and his children's children gather about him. He and they were content with such things as they had. Now-a-days the cry is all for progress, no matter in what direction; for education, no matter whether it fits us for our proper life work or not. We must pull down the old house and build a new one, shining with fresh paint, an eye-sore in the landscape; our boys and girls must be sent off to the high school, the one finally to become a petty lawyer's clerk or a seller of ladies' underwear, the other to be trained to teach children the significance of the verbs "to have" and "to get," or to play "Home, Sweet Home" in the second floor back of a city flat. So the long list of "abandoned farms" grows longer year by year, and country life is scorned by those who should know better, and would, if only they had ever received a single hint of the fact that education, from their standpoint, should consist mainly of the ever growing knowledge of a love for the life that is all about them on the farm where they were born, and to which they are the natural heirs. It is in order to impress such facts as these, to arouse an interest in the varied world of plants on the part of those whose life is or might be lived in its midst, to indicate the added satisfaction which comes with every fresh glimpse into the mysteries of nature, to show the way by which farm life may be transformed from a species of drudgery into the acme of delight, to open the eyes of body and of mind to the wonders

which press upon us from every side, — it is with such a hope that I have spoken to you this evening upon the Study of Botany.

I cannot close this lecture more fittingly than in the words of one who, more than one hundred years ago, faced in England the same conditions which confront us to-day in this country.

“Contemplative persons see with regret the country more and more deserted every day, as they know that every well-regulated family of property which quits a village to reside in a town injures the place which is forsaken in many material circumstances. It is with pleasure, therefore, we observe that so rational an employment of leisure time as the study of nature promises to become popular, since whatever adds to the number of rural amusements and, consequently, counteracts the allurements of the metropolis is, on this consideration, of national importance.” — *Gentleman's Magazine*, 1789.

Ex-Governor HOARD. Is there any chance to say anything here?

Chairman SEELEY. Yes, sir.

Ex-Governor HOARD. I have been exceedingly interested in this lecture, but it is a good deal to me as it was when I first tackled Bowditch's Navigation. And I have never yet seen any man who understood navigation sufficiently well to avoid all wreckage. But I want to say a word to Professor Sturgis, and I want to enlist his kindly effort. I would like to see botany come down from the magnificently high pedestal on which he has put it to where us common fellows could make use of it. I would like to see a small book that might be entitled “The Botany of the Farm,” and you, sir, are just the man to start in and write it.

(Professor STURGIS. I would, if I knew anything about it.)

He says he would if he knew enough about it. Well, most all men who reason more from what they don't know than from what they do, are modest enough to say so in the same manner.

Now, I want to call attention to one little thing. I have been a student of a few farm plants, and, like yourself, I have striven to be more of an observer of the laws of those plants than I have to know what their scientific appellation was. For instance, the clover plant. There needs to be to-day sown broadcast, all over this country, a practical study of the clover plant from a botanical standpoint; and there is none. Clover is one of the most valuable plants the dairy has to deal with. The various families of clover, they belong to the classification of legumes, the alfalfa and the red clover are exceedingly useful in it. Go through my country to-day, and you will hear no more serious lamentation among the farmers and the craft, than the fact that the clover is killed. And the question with me for several years was, what killed it? For instance, our farmers sow their crops in the spring of the year, and, at the same time, seed with clover. Almost universally the farmer says, "I can't afford to have an idle field, and I must sow a crop with that. I must get a crop of grain, and, at the same time, hope to implant a seeding of clover." A usual thing with them is to seed with oats; quite usual. They harvest the grain, the crop of oats, and the clover looks all right; but it is in the period of the most intense heat of the season, and all at once that whole field of young clover is dead, and they have no hope of clover. I wanted to know what killed the clover. That is one question; I went to studying the biology of the oat plant as well as the clover, and I discovered from the lots of experiments at Hampton and in the Wisconsin station that it took 500 pounds of water to make one pound of oats; and I said, no wonder that this soil has been depleted of its moisture, when you think what the oats and the sun both have done. Consequently, I made a change, and with every bit of clover seeding I cut the oat crop before it seeded. I cut it off as soon as it was fairly headed up, and I had no difficulty in saving the clover. Now, there was a biological fact, wasn't there? There was a botanical fact. But no man taught it to

me. With all that great wealth of scientific information, there wasn't a man down within a mile and a half of where Hoard was. Now, that is the difficulty to-day, Mr. Professor, with much about science. It is like a Mother Hubbard dress, it covers everything, and don't touch anything.

Now, another thing, I mean, I want science to come down to where I can use it commonly. Squeeze down. Another fact, I discovered that clover would give one crop, and that would be the last. All through our country one good seeding of clover come on you know, this season, for instance, and if it grew and snowed through all right, the next season we would get a fine crop of clover hay, maybe get two crops, and after that there was sickness and death; and the farmers said the ground was clover sick. I wasn't satisfied, and I went to studying the botany of the clover life. I discovered that it was a biennial, that it took two years for it to sprout, grow, and come to seed bearing, and that when once it had fulfilled its mission of producing seed, it commenced to die. Then I said, "Here is the key to the difficulty with the average farmer; he lets that clover seed too long before he cuts it." He allows it to blossom and to continue too long, until seed is established. A plain old farmer, who has the power of observation, established a nice field of clover that was in existence nine years. How did he preserve it? He cut it every time when it first appeared to blossom; when he saw just the blossoms first appear. He had some difficulty in the early part, in June at that time, to cure it, but he cured it in the rick with a hay cap, and then when the next crop came on, nature, always assertive, kept producing more hay, and he kept cutting it off just at the right time, and up it came again, and I saw him cut three fine crops of that clover; but, mind you, not one instance was there of producing seed. Now, that was a botanical fact, wasn't it? But it wasn't taught to me by the scientist. Taught to me by simple-minded, old Hiram Smith, one of the most sage men our State ever

produced. The power of observation is a wonderful one. My grandfather told me once of an Indian describing to him who stole his deer. The Indian had shot a deer, bent down a stout young sapling, and had strung the deer to the sapling, and let it spring back again, thus swinging the deer up out of the way of the wolves. Somebody stole his deer. He described the man who stole it to my grandfather. He said he was an old man, a white man, a short man, lame in the left foot, had a short gun, and a little dog with a short tail; but he had never seen anybody. He knew he was a white man, because he toed out; he knew he was an old man because he could not carry the deer but a little way before he sat down to rest; he knew he was lame in his left foot, because the left foot made the least impression. He knew he was a short man, because he had to make an Indian ladder, pull down another tree and lop off the branches to get up to where the deer was; he knew he had a short gun, because he saw the marks in the snow where he had leaned it up against the tree, and he knew he had a little dog with a short tail, for he saw his track, and saw where he had sat down in the snow. He was a born Sherlock Holmes. Now, the power of observation on the clover plant. If someone would take the common plants of the farm, that you and I depend on, the grasses of the farm and the plants of the farm, and simply confine himself to the positive and the negative plants, those that are for and some of those that are against, and give us a simple, clear exposition of the laws of their life, he would be conferring upon agriculture one of the most conspicuous benefits that could be. I have been busying myself with the study of alfalfa. I cut four crops of alfalfa hay last summer on ground that when I first sowed the alfalfa, there wasn't a man in Wisconsin hardly but told me I was bound to fail, and that it was ridiculous. I have now about twenty acres of alfalfa, and I have been making some experiments. I have just got from Secretary Wilson last

spring sixteen pounds of seed from Turkestan, was a dollar a pound, and it was tied and bound, and had to be transported 2,000 miles or so on backs of camels; but it was brought over here, a limited amount of it, and I got enough to sow half an acre, and it is doing splendidly, and it went through forty degrees below zero in North Dakota last year successfully. Professor Wilson of the South Dakota Experiment Station went to that country and got it.

Now, alfalfa is one of the most valuable plants in existence to-day, and way on the high hills of Madison County, N. Y., 800 feet above the valleys, within six years there has been a wonderful progress in growing alfalfa; and most everybody has believed that it was a plant that could not be grown without irrigation. There are a lot of things that are coming to us, and I hope to see the science of botany made contributory, more than it has been along these simple lines, to the good of the farm.

Chairman SEELEY. I said to you I was sorry I did not know more about botany; and I am sorrier still, more sorry now after hearing what was said; it reminds me of what my father used to tell us boys of a large swamp a little way from our house, and he would say, boys, if you will take the trouble to take a handful of plaster, throw out into that swamp a handful on to one of those bogs, I warrant there will be clover there — clover growing there in less than two years. We used to say, father, how could the seed get there; he said, I don't know how the seed will get there, but I know clover will grow there if you will put the plaster on this swamp. You can try it any of you, you can go right into a place where you never saw a speck of clover, and you will find the clover will grow there from the dusting of the plaster. We did it.

Chairman Seeley here makes the announcements for the next morning's program, and the meeting adjourns.

MORNING SESSION.

New Haven, Conn., Dec. 12, 10 A. M., 1900.

Convention called to order 10 A. M., Vice-President Seeley in the chair.

THE PRESIDENT. The first thing on our program this morning is an address on the subject of "Some Modern Conclusions in Dairying," Hon. William D. Hoard of Wisconsin. Wherever there is a cow or a dairyman, this man is at home. I have the pleasure of introducing to you ex-Governor Hoard of Wisconsin.

EX-GOVERNOR HOARD. Mr. President and Gentlemen: Sometimes, ladies and gentlemen, it is not a desirable thing for a man to be spread over so much territory as to get too conspicuously thin. I will try this morning to discuss in a few words, and not so very few, either, some ideas upon this dairy question.

SOME MODERN CONCLUSIONS IN DAIRYING.

HON. WM. D. HOARD, FORT ATKINSON, WIS.

Of necessity my topic deals mainly with the past. If there is any instruction therein, it must be gained from inference. Yet it is always instructive to look into the prophetic trend of history. From what has been, we may, within certain limitations, reason as to what will be.

The last third of a century marks an epoch in the progress of the dairy industry in the United States and Canada, and as well, to a certain extent, in all other parts of the world.

There is something peculiar about this industry in its effect on the men who follow it intelligently. They stand foremost in the ranks of agriculture in the point of intellectual conquest. Dairying calls for the best judgment and work in the tillage of the soil and the sowing of grass and grain. It calls for a special knowledge in the care and harvesting of

those crops, in order that they may impart their highest food value.

It calls for a special study in the principles and art of animal feeding, so that the cow may be given a ration fitted to the functional work she has in hand and our highest profit.

It calls for a special judgment in the matter of constructing barns, stables, silos, yards, and drinking places, for we are dealing with a high order of animal life. Herein is valuable also a knowledge of farm sanitation, what its principles, limitations, and results are.

We are responsible for the crowding together of large numbers of cows, and we must hold ourselves responsible to them, and the public whose food they yield, for as perfect and healthful a mode of life as it is possible for us to provide for them.

It calls for a knowledge of the laws of reproduction, whereby we may make use of the forces of nature to the manifest increase of dairy power in our cattle. We have no right to sit still or act indifferent on this question. The cows of a State are what its dairy farmers have made. They represent accurately just the amount of forethought, skill, and judgment that has been used in their breeding and development.

No other branch of agriculture is as socialistic as dairying, for it is organized very greatly all over the land into cheese factories and creameries. Here again is a special endowment of sound sense required. The moment such organization takes place the farmer finds himself no longer a producer but a manufacturer. He must learn to co-operate with his fellow farmers, according to the laws of business. He must study the finer economics of manufacturing. He is to be the creator of one of the finest foods on earth which, "like Cæsar's wife, must be above suspicion."

These are some of the things the modern dairy farmer must be. If he grows to it, well and good. If, on the contrary, he is "ignorant of these things" and does not strive to mend his ignorance, the result cannot help being disastrous.

It has been a marked feature of American dairying to be foremost along many of its lines.

In a pursuit where men must know so much, "A little knowledge is a dangerous thing."

There has been massed at this point a wonderful array of study and investigation. Some of the brightest minds in modern chemistry, biology, and physics have laid the fruits of their investigations at the feet of the cow.

Our civilization has been constantly growing more complex, and the action of its material and social forces are compelling a different order of domestic, as well as public life. Changes have come so swiftly and silently that the modern men and women are in some respects a different class of beings than existed a third of a century ago.

Certain it is that, owing to a marked change in the order and character of modern life, the tastes and demands of the public, as relates to food, have also greatly changed.

Speaking of the element of change reminds me of an incident I witnessed at the World's Fair in Chicago in 1893. While standing in the electric building, I noticed an old lady with a typical American face, attended by a troop of young girls. The remarks she was making were so decidedly original that they were evoking shouts of laughter from her companions. Concluding that I was losing a relishable part of the program, I gradually worked my way up to the group just as they had persuaded the old lady to place the sounders of a phonographic machine in her ears. The play of that fine old face as the perception of what was being done slowly reached down through her comprehension was truly enjoyable. Finally she plucked the sounders vigorously away, and said: "Girls, the Lord will have to clean out this race, just as He did in Noah's time."

"Why, aunty?"

"Well, if He don't, He will soon have no show."

It is a different proposition to be a dairyman of to-day to what it was thirty years ago. There are altogether too many in the business, however, who have not yet found that out.

Let me enumerate some of these changes in the order in which they have occurred, and show by inference, at least, what effect they should have on the dairyman of to-day, if he seriously calculates to win profit from the business of keeping cows.

(1) The first marked change, as I view it, was in the inauguration of refrigerator transportation by rail and steamship lines. This method, rude at first, was introduced about

1870. At that time it consumed five days to send a carload of cheese from Wisconsin to New York city, and the freight cost two and a half cents a pound in common box cars. In hot weather it was very hazardous to ship at all. To-day, cheese is sent in fine refrigerator cars in forty-eight hours at fifty cents a hundred. In addition, refrigeration has been adopted on ocean steamers, and all perishable goods are now carried to the ends of the earth in safety. Not only this, but cold storage warehouses all over the country take the surplus product of the summer months in butter, cheese, eggs, milk, meats, and fruits and preserve them in good order for future consumption. The modern dairyman must learn from refrigeration the lesson that civilization has provided against the great wastes of former times, and so has equalized both supply and price over the whole year. He cannot look for periods of spasmodic high prices as formerly existed, and it is better for both producer and consumer that they should no longer exist.

(2) At the great International Dairy Fair in New York city in 1878 I saw the first exhibition in America of a centrifugal cream separator, a Danish invention. Now this method is rapidly superceding all other devices for this purpose, except among that class of farmers who take no note of time or progress, and throw away their hard earnings in the purchase of a dilution separator humbug. This invention, taken in connection with the cheap ice-making machine, another modern invention, opens up a vast territory in the semi-tropical regions of the United States and other countries to dairy production and enterprise. There is no longer the advantage of a narrow so-called dairy belt, and the Connecticut and Wisconsin dairymen must dismiss that idea and seek commercial advantage in greater skill and economy of production.

(3) The introduction of the associated creamery system is bringing vast regions of territory into dairy production. But it has its drawbacks as well as its advantages. These seem to run through it as a natural effect, a sinister thread of bad education in the patron. Take, for illustration, any community where private butter making is practiced and where the farmer is in sharp contact with the market. He is at once educated by that market to an understanding of the value of good cows, clean stables, pure milk, and the careful handling

of the product. Start a creamery in that neighborhood and in a few years we find a large proportion of these patrons have degenerated from their former ideas of intelligent dairy work. They are not now where the full responsibility for their actions tells directly on their revenue. They become indifferent to the breeding of good cows, careless as to the stable sanitation and cleanliness, and, in many instances, positively dirty in their handling of the milk. I have seen communities go through this stage. There is only one remedy for it that is practical. That is a reform in creamery management. Where a system of inspection and prizes for the best-kept herds and stables has been instituted it has worked a desirable change, but the creamery is here to stay, and its weaknesses, as well as its virtues, should be discussed.

(4) Another great modifier in modern dairying has been the invention of new and improved machinery. The modern butter maker must be an expert machinist. Hence at the modern dairy school this feature is made the subject of much study.

(5) One of the most important inventions of modern dairy science is the Babcock Test. It opened a way at once for the establishment of a practical and just method of associated creamery work, whereby every farmer could have credit for just what he put in the pool. Its effect also on the growth of knowledge concerning the cow has been great. As yet the individual farmer is not making use of this great factor as he should. There seems to be a lack of appreciation of this tool, an unwillingness to consider it as valuable in a herd of cows as the milkpail. I make this statement almost without qualification, that every farmer who is found to be the owner of a Babcock machine, his profits per cow will also be found to exceed his neighbor's from 20 to 500 per cent. Some farmers, who do not own a test machine, make large use of the one at the creamery to test their cows, and, in a partial manner at least, secure the benefits of the information and judgment it imparts.

(6) Great transformation in the art of butter and cheese making has been wrought by the discoveries in bacteriology, upon which are based the invention, and now quite general use, of the butter culture and starter, the acid test for the ripen-

ing of the cream, the curd test for impure milk, as well as the pasteurizing and sterilizing of milk and cream.

(7) In veterinary science has come the discovery of the tuberculin test for the determination of the existence of tuberculosis in our cattle. I am aware of the prejudice many dairy farmers have against this test, but it is a prejudice they, of all men, should not entertain. The question is a practical one. Can I, as a dairyman, afford to keep diseased cattle? Can I afford the loss in productiveness, in quality of product, in the number of valuable cows which must, eventually, die from this cause? Can I afford the reproach of my own judgment, as well as that of the public? It will not answer these questions to say that there are dishonest veterinarians, or that the tuberculin test is not absolutely exact. The question of honesty is not confined to veterinarians alone, and the tuberculin test is the most exact of any method known to science. I make the question an individual one — What can I afford? But the public are watching us. They realize their interest in our decision. Upon that decision will depend, very much in the future, whether there shall be an increase or decrease in the consumption of dairy products, and if we are wise we will not shut our eyes to the situation.

(8) The invention of the silo has proved one of the greatest factors in reducing the cost of production. Now, dairy work is extended over the whole year. Winter dairying is in general vogue. Still, there are farmers who are unconvinced, and I presume many of them always will be. They have my sympathy, the same as does the man who blows out the gas.

(9) One of the new and already powerful factors of our progress is the modern dairy school, and the short course in our agricultural colleges. Ideas about education have changed. No longer is it deemed the height of wisdom to educate men away from the farm, away from nature, away from a condition of intelligent self helpfulness. We need one thing more as an established outpost: that is, the teachings of the elements of agriculture in every common school in our land. The tide is already setting this way. In Ontario and Wisconsin decided progress has been made to train up the child in the way he should go.

I hope to live to see such a condition of things prevail. Then I shall have hope that the wastefulness of American

agriculture, the despoiling of the nation's fertility, together with the decline of agricultural pride and spirit which has marked the older sections of the United States, will cease. Then will the ranks of agriculture be recruited from the best and most intelligent minds of the country. Then it will be deemed a work of intellectual distinction for any man to be a successful farmer.

At every step of the way in this record of wonderful progress and change has the dairyman been indebted to the student of science. It ought to teach every one of us the lesson that we owe it to ourselves and our hope of profit in this business, to be more teachable than we have been. The conservatism of ignorance is one thing; that of intelligence, quite another. The first brings darkness; the latter, better light.

The object and effect of this progress has been to simplify and make clear the processes of handling milk and the making of butter and cheese, and reduce the very expensive hazard which before lay between production and consumption. It has given the dairyman a larger hold on the forces of nature, "a reason for the hope that is in him," and to the consumer, the product of the cow as near as possible in its original purity.

It is evident that no man can successfully conduct a dairy of cows on the limited stock of knowledge that sufficed thirty years ago. All the logic of our civilization is against it. The proposition has grown to be too great. There is too much involved in it. We must grow with it.

CONCLUSIONS.

In the light of what has been done in the last third of a century, and the trend of events as we can see them, what may we conclude?

(1) That no particular fear of the dairy business being overdone need be entertained. There is a constant tendency in Western communities especially to swing away from the dairy towards beef production. This factor is already at work in Iowa and Minnesota. Thousands of farmers have commenced to reduce the dairy capacity of their herds by the purchase of beef-bred sires. The result in a few years will be a class of cows reduced in dairy production from twenty to fifty per cent. The Western farmer is not a dairyman by choice.

He dislikes the work of milking; the dairy cow and the dairy farm are not his ideal, and the business is more likely to lessen than increase in the middle West. This should be taken as an encouragement to the Eastern dairy farmer.

(2) That the exigencies of the business, with all this crowding in of improvements and changes, are such as to call for a much higher order of intelligence among farmers. More study, more thought, more effort to be intelligent must be exercised by the man who keeps cows, if he expects to meet the situation and win profit from it in the future. To this end, farmers should give their sons the advantage of a winter's or two winters' term in the dairy school, and the short course at our State agricultural colleges. If any of these colleges have not yet inaugurated such departments, a strong cry from the farmers should go up for their inauguration at once. Every dairy farmer and his sons absolutely need all the dairy education they can get.

(3) The great foe to dairy progress in this country is the existence of a fraud and counterfeit in the form of imitation butter. It is a reproach to the civilization and rectitude of the age, a constant menace to the development of one of the most important branches of our agriculture, and a grievous cheat and swindle upon the innocent consumer. It exists only for the enrichment of a dishonest element in our commercial life, and by virtue of the influence of its ill-gotten gains among leading politicians. It would not exist a year as a foul blot upon the fair name and progress of our country if the farmers of the land would use the political power they have for its suppression. Common honesty, patriotism, and loyalty to the honor of the name of dairyman demand that it be driven back to its own ground and color as a substitute, and not exist as a base imitation of butter. "Uncompromising hostility to these counterfeiters of butter" should be the watchword of every farmer in the land.

(4) I believe the business of dairy farming with its natural adjuncts of pig and poultry raising is the future redeemer of Eastern agriculture. If Danish farmers can buy Western corn, oil meal, and cotton seed meal, and make money producing butter for the English market at an average price less than American consumers pay, why cannot Yankee brains and thrift thrive on this business in the Eastern states?

The PRESIDENT. There is an opportunity now to ask Governor Hoard any questions which you choose.

A MEMBER. The Governor in his interesting address speaks of ensilage. I would like to inquire if there is any means of preserving it that is not well known and understood by the public that he has in mind. I mean, of course, to prevent it from souring. The milk condensers reject milk on account of the quality caused by the cows eating some grades of ensilage, that is, after it has soured to some degree. I would like to ask the Governor if he knows of any method of preventing that?

Ex-Governor HOARD. A good deal of that is due to prejudice. I know it exists, but there is no known rule in ethics or anything else that can meet prejudice. Some of the Western condensers to-day are offering inducements for ensilage milk, notably that of the United States Company at Lansing, Mich. I have no sort of patience with the ideas which have been presented on that subject. No sort of patience whatever. In the West we use ensilage, and use it extensively. That is particularly true in Wisconsin. It is one of the greatest dairy states in the union. We supply seven thousand families, many of the finest families in Chicago, Pittsburg, Milwaukee, and St. Louis. It is the highest class of trade, and we supply them every week with their butter. I am speaking now of our creamery at Fort Atkinson. We have eight hundred patrons that bring their milk there, and nearly all of them have silos. Now, do you suppose for a moment that with that critical trade that we supply, that has to be suited with the very best butter that can be produced, and that has to be delivered to them every week by our own machinery in those cities, do you think for a moment that those people would be suited with something that is producing a deleterious effect? Oh, no. It is ridiculous to think of it. The facts don't point that way.

Now, I know that milk condensers made some trouble in

the early history of the silo movement about that question, but I don't take any stock in it at all.

It is a great question, my friends. I spoke to you about those two farmers, one of whom was getting 600 per cent. more than the other. Those of you who have been readers of the *Dairyman* know of the fact that the *Dairyman* has been collecting statistics concerning cows of one hundred herds. That has been done right in my own county. I took one hundred herds and analyzed every cow, each and every one, for what it produced, and what it cost. We also made an analysis of the amount of money received for every dollar invested in the business. In that hundred herds there was one man that received \$2.80 for every dollar invested in the business. Now, do you know of any business in Connecticut that is beating that on dividends? Another man received only ninety-six cents for every dollar invested. There was that wide difference. Now, we have just completed a table of the census in Iowa, and it runs down to where men are receiving only two cents for every dollar invested in the business. There are a class of men in this country that deserve criticism. Those men are conspicuous to-day among the farming ranks. They are to be criticised because they are adopting a policy which is fraught with great danger to the future of dairy interests in some Western sections. Speaking of those eight hundred men in my own bailiwick, I know them, because my work is among them. I tried to stimulate them, and I studied those eight hundred men there all the time. I think I know something of what is going on among them.

Now, I say to you that a man cannot make butter, and he cannot produce milk or cream to the best profit and advantage unless he employs a silo. It is nonsense to stand here and haggle and cavil over the silo question, or to hunt up a lot of objections against it. The silo is here, its influence has been demonstrated beyond all matter of question, and it is now too late to discuss it. It seems to me that this idea is well

illustrated by a story of Stonewall Jackson. He came to a certain stream one day which he was obliged to cross. He said to his bridge builder, old Jack Armstrong, "I want to cross that stream, and I want to cross it by four o'clock to-morrow morning." So the chief of engineers was given the plans. Jackson says, "I want that bridge built anyway." And when old Stonewall said a thing he meant it. About three o'clock the next morning he was awakened by old Jack Armstrong, the bridge builder, who was outside of his tent, and he said, "General, General!" "Hello, what do you want?" "Your bridge is built; the plans will be along about noon." So it is with silos. They are here to stay. And it is useless to discuss their influence.

A MEMBER. I am simply a learner and I will be glad if Gov. Hoard will give us some further information about silos. I want to know what kind of materials we should use in a silo; what is the most satisfactory and what he thinks about it.

Ex-Governor HOARD. That opens up a pretty broad question. There is more to that than we would have time to go into to-day. A silo is a system for preserving corn fodder. A silo is a thing every dairyman should have. Do not wait. Put up a silo. Let me say to you that among our patrons this past year we had a very severe drought. It started on the 4th of April and did not stop until the 4th of July. Now, then, about forty of our patrons had summer silos. And those men had put up those silos the year before for just this contingency which arose and which almost every year strikes them. There was no diminution in their milk. As soon as the pasture dried up they opened the silos and commenced at once to feed this ensilage to the cows, and the cows held right steady up in their milk. It was cheaper than pasturage. But you cannot get one man in a thousand to see it. It is absolutely cheaper than pasturage, and particularly that kind of pasturage which was bringing loss. Now the summer silo.

has to be a little in addition to the winter silo. In case you don't want to use a summer silo it can be used in winter, but the summer silo is opened when it is hot weather, the winter when it is cold. You have consequently to make one a narrow silo. You should reckon about a ton to a cow for summer use. When you open it in hot weather the heat, of course, has affected it at the top, and then you will have to go a little deeper, but as soon as you do that you strike good, sweet ensilage all the time.

The PRESIDENT. I have taken some pains to find out what the objections of the condenser men are to the feeding of ensilage. They acknowledge that they have no special objection against it except this: they admit that it is good, they don't question it at all, but it seems that Borden's folks shipped a car load of condensed milk to South America, when the silos first started. Some of their patrons were feeding poor ensilage, so that the milk did not keep, and they suffered a loss, and from that reasoned that others might be feeding ensilage of the same character, or feeding something that was not fit. You understand, of course, that they are not makers of butter. They don't extract butter direct from this milk, the milk is condensed and they send it all over the world. That was their idea, that the use of ensilage affected the keeping qualities. They admit that ensilage is probably first rate for dairy use.

Ex-Governor Hoard surprised me by saying that the dairymen of Iowa and some other States of the West were beginning to go back to beef products. I was not altogether satisfied with the reasons which he gave for that. I wish that he might amplify that. He is familiar with agriculture from Wisconsin to Texas, and he might tell us, I think, whether or not the prospect of the beef market in the future has anything to do with the action of those Iowa dairymen.

Ex-Governor HOARD. I said to you that they are commencing already to reduce dairy production by introducing

into their herds beef bred sires; it is impossible in the nature of things to hold up the dairy type if that is done, because the cows of those herds will be the daughters of those sires. It is impossible to breed in more beef without you breed out some butter.

The PRESIDENT. Do they prefer to make beef because it is more profitable?

Ex-Governor HOARD. They prefer to make beef because the market is good and because it is a lazy method of making money. Already in western Iowa, in Kansas and Nebraska, and through that section, hundreds of creameries have been closed up; the farmers have been attracted by the high price of beef, but even that is not the whole of it. It is an indolent way of making money. The average farmer don't like to work. It is cheaper and easier to let a calf suck a cow and then for him to get what he can out of the calf, and let things go along in that way. It is an indolent way for the farmer to do, and at the same time he gets something out of it in return. The men who are doing that, however, are not intelligent, and they are doing one of the worst things they can. Some years ago there was a large number of them in the beef business, but when the price of beef became low they built creameries and flooded the country with butter. To-day the pendulum has swung the other way and the creameries are being closed and all over the country they are doing this thing. They are introducing short horns into the herds of dairy cows, because they can get a little more for the bull calves. And do you know, my friends, it is one of the stupidest things they can do. If you Eastern dairymen are alive to the situation you will take advantage of all that kind of tom-foolery that comes in your way.

The PRESIDENT. Having once embarked in the dairy business I should have supposed they would have found it more profitable and that with the new improvements that are

going on in that business it would have stimulated these men to have continued.

EX-GOVERNOR HOARD. Beef was at a very low ebb when those creameries started. Beef is now high and everything connected with the meat market is high. Those men have been trying to hang on. They have taken hold with one hand and let go with the other. The action and policy of these men have reduced the butter production of Iowa in the last year something like two or three million pounds.

Now I think, my good friends, that the Connecticut farmers are just exactly where the New York farmers are and the Pennsylvania farmers. The future of farming in this country should be based on the cow; that is, if dairying is to be made a specialty. To be successful in any business nowadays you must make it a specialty. The men who are farming in Connecticut and using Connecticut lands with all their disadvantages, cannot farm according to the standard of fifty years ago, nor can they conduct a dairy according to the standard of fifty years ago. If you Eastern dairymen and farmers are fully alive to the situation, there need be no fear for the future of those interests here in the East.

Music by Mrs. Rosabelle Frushour Lines.

Secretary GOLD. Col. Wood has to leave soon, but we want to hear from him on this subject.

Col. WOOD. I would like to say one word upon a subject that Governor Hoard has referred to, and then I would like to ask a question. He has told us that there is room for great encouragement to the eastern farmer and eastern dairyman from the fact that in the great dairy districts of the West there is a turning of attention to beef production. Of the accuracy of his statement there can be no question. It seems to me, however, that there was more to the statement which

Governor Hoard made than perhaps the governor himself recognized. The facts which Governor Hoard has given us amount simply to a demonstration, but I think it would be well for every one to hear something of the whys and wherefores of this matter which has such an intimate connection with the business in which we are engaged. Perhaps if I related a little history it will throw some light upon this discussion.

Twenty years ago there became a great rage, almost a craze, for capitalists to go into what was called cattle ranges. The establishment of great cattle ranges in the semi-arid districts of our country running back to the Rocky Mountains. Capitalists came over from Europe in very considerable numbers, and many in the eastern cities of our country also engaged in this enterprise. Governor Roosevelt, in my own state, became a cowboy, and sank a considerable portion of his fortune in an undertaking of this kind. These cattle ranges were based on the theory that they could raise the cattle upon those lands where the buffaloes formerly ranged. Upon those lands where the buffalo grass grows, that little curly gray grass that covers the ground of that region, and which will grow in any region where there is an annual rainfall of ten inches in a year, not enough to produce a crop, as any cultivated crop requires from sixteen to twenty-four inches in a year to produce a dry weather crop, whatever it may be in any district. The theory was that the cattle could be raised on those ranges up to the fattening age, and then brought into the corn-growing district, into Nebraska, Illinois, or Iowa, and there fattened for the market. The business was overdone. Cattle were put upon those ranges, far beyond the ability of the ranges to carry, and the losses were enormous. The price of beef went steadily down, and these cattle were brought back to the corn-growing districts, and made ready to place upon the beef markets. They were bought up by the Armours and Swifts, all of that genus who knew how to buy

for the lowest penny, and beef went down so low that the farmers in Illinois and Wisconsin were forced to give up raising beef cattle and go into dairying, an interest in which they have since led the world. Now, the effect of all this overstocking of the ranges has resulted at the present time in such a diminution of the production of cattle from those districts that the farmers in Iowa and Wisconsin and all over that region find that they can now raise profitable beef cattle, because the production upon the ranges of the far West is not going to supply the demand. There is an explanation of the course which is being adopted by many of these men. Am I not correct, Governor?

Ex-Governor HOARD. In one sense you are, but in another sense you are not. That is a partial explanation of it. But the rest of it lies in the everlasting laziness of the farmers themselves who prefer to raise beef than butter.

Now, right there just let me say one thing. You know Wisconsin is not a beef state. It is distinctively a dairy state. Its dairy product amounts to about forty millions annually. It has over three thousand creameries and cheese factories. It is distinctively a dairy state, for right in my county where the annual production per cow has reached 259 pounds, and where there is a cow to every inhabitant — and you know it is the boast of Holland that they have a cow to every inhabitant, yet in Jefferson County there are 40,000 cows to 36,000 people. In spite of that fact, however, there are farmers there to-day that are putting the knife to the throat of their future because they are insisting upon introducing a beef strain into their stock. Now, if that sort of thing goes on, and you breed that type of cows, your future cows must be the daughters of those beef-breeding sires, and the inevitable result of it will be to reduce the butter production in your cows, and then where will they be with neither male or female cattle of a distinctively dairy type? It means a blow at one of the most important

interests of that state, in my judgment. But you cannot get those men to see it.

Now, I want to say to you that just in proportion as that sort of work goes on in the West, in just that proportion is it a matter for encouragement for eastern dairymen. For it is a fact that successful dairying must be done with the dairy bred cow, and if they destroy the distinctively dairy type the western men will be placed at a disadvantage with those sections where that type is maintained.

Col. WOOD. The question that I wish to ask is this: In the beginning of the Governor's most interesting address that was illustrated by so many fascinating side-lights that he threw upon it, he said that within the last twenty-five years there had been devoted to the dairy industry an amount of intelligence and scientific skill in this country that had been given to no other industry. In that statement I believe he is entirely correct. Now, I want to ask him to explain, for it is a matter to which I cannot give an answer. I don't understand why it is in the markets of the world, in the markets outside of this country, why our dairy products command a lower price than the dairy products of any other dairy country of the world?

Ex-Governor HOARD. I can answer that in two words: American dishonesty.

Col. WOOD. If the Governor will, I would like him to amplify that and show how it works, for to me it is a most humiliating fact if that is the case.

Ex-Governor HOARD. It is to me also.

Col. WOOD. There is nothing in connection with the industry of this country that has caused me so much shame during the past year as this fact. I spent considerable portion of the past summer in Denmark in examining the dairy industry of Denmark through and through. It is a country whose dairy products command the highest prices of the dairy products of the world. I find that in the market quotations

received, the dairy products of Canada are ahead of us. Their products are more favorably thought of than ours. I find that they range way above ours. Now I wish that Governor Hoard would explain to us why this is thus.

Ex-Governor HOARD. The other day in pressing the question of the oleomargarine legislation before Congress, I saw a wonderful humiliating thing. A gentleman had come into Congressman Grout's room, and he showed me a six-pound pail of oleomargarine designed for export. The federal law is that they must put a brand on these packages. That pail apparently was properly branded, but that pail had a false top, and on the top was the brand, oleomargarine. It was made here in Rhode Island, it was marked according to the federal law, but that top was removable, and when it was sent away it was taken off. That was designed to go to the West Indies, and was to be sent there to be sold as American butter. It was said that the devil tempts every man, but the oleomargarine man tempts the devil. The United States Revenue Department has no such rascalities to deal with in any of its work as it has in the oleomargarine business. I never saw such rascalities in all my life as there is in that business. And do you wonder we have so corrupted the native fibre of American honesty with our damnable commercialism and policies that, to-day, we are the synonym of dishonesty all over Europe.

You ask about Denmark. Denmark makes it a penal offense punishable by a fine and imprisonment for any man to export a pound of adulterated butter. Canada absolutely prohibits the manufacture and sale or the dealing in any kind of adulteration or counterfeit or imitation of dairy products. The Canadian government as well as the Denmark government is a unit, and can pass that kind of law.

We are so situated that we have flooded the markets with base imitations of butter just as we did with filled cheese, which destroyed our foreign cheese industry. Why, we were

sending over to Europe at one time fifteen, sixteen, or seventeen million dollars worth of cheese, more than Canada sent. Now we send three million dollars worth, and Canada sends twenty. Why? Because the Canadian cheese is held up to a rigid standard, and agrees in quality. The Englishman knows if he gets a bit of Canadian cheese it is an honest product. The filled cheese that we used to send was a cheese where the butter fat had been taken out and oleomargarine oil put in. We have got ourselves only to blame for the situation.

Secretary GOLD. Two or three questions have come in recently that bear directly upon the discussion in point.

Q. "Are tightly closed barns the cause of tuberculosis?"

Secretary GOLD. I will answer that myself. They are not. They are favorable breeding grounds or places for the growth of the germs if they are brought into the stables.

Q. "How does the sale of process butter affect dairy interests in this State?"

Ex-Governor HOARD. I do not know.

Secretary GOLD. That is why we asked you, because we do not know.

Ex-Governor HOARD. Process butter is simply taking the waste product of the farm that contains butter fat and manipulating it so as to make it marketable. It is composed of the dirty, decomposed and melted butter products of the average farm. It is melted, and the original oil gotten out of it. They then take that and introduce into it milk, and it is put through a process which turns it into a product which is marketable. It has, however, the original butter oil, although it comes from doubtful sources. By that means they manage to make a product which is not an imitation of butter, but it is a manipulation of it, and the worst thing about it is, as it is with oleomargarine, it is sold for butter. It is another manifestation of the dishonesty which has crept into American methods through the spirit of commercialism which is so prevalent among us. It is a cheat and a counterfeit. It is a difficult

question to know how to deal with it. It is not an imitation of butter because it has the original butter fat, although it is not in its original condition.

Dairy Commissioner NOBLE. I would like to ask one question in connection with that subject; while I would emphasize all that Governor Hoard has said in regard to the oleomargarine question, and as to the exporting of oleomargarine, and the use of it in our country. Has not process butter, or renovated butter, made for exportation, had a great deal to do with lowering the price of all exported butter?

Those of you who were at the pomological society's exhibition last year will remember the interesting address which was delivered by a gentleman upon the cold storage plant at South Hampton. He explained to us their reasons for the objection to American butter. He stated that all butter which came in there from, may be other places, and especially from Sidney, Australia, is bought there day after day at a regular price, and no one questions it, because its reputation is securely established for uniformity and equality and weight. But he said that there was no American butter ever bought there by merchants without being tested and tried, for they had no assurance that the butter which was bought to-day would be anything like the quality of that which they perhaps might want to buy to-morrow. Process butter, it seems to me, as Ex-Governor Hoard has explained, has injured our business and our trade, not only in Connecticut, but all over the country, and the export trade as well. Isn't that so?

Ex-Governor HOARD. I think so. I think process butter has been imposed on the people for butter, but it does not have the keeping quality. They use in it an antiseptic as a preservative, which is another objection. The trouble with the whole question is that I do not know what recourse we have got or what remedy we can use by which we can reform this condition. I believe, for one thing, that our federal government has got to be "jacked up," as they say out West.

Got to be "jacked up" to some efficient action on this question.

Mr. HALE. Haven't you got to begin further back than the government, and "jack up" the people at home?

Ex-Governor HOARD. Yes. That should be a part of it, but the federal government does have this power: it can control interstate commerce, and it has controlled it to an extent. The federal government ought to look at this question from the light of the interests of the American people, but it has not yet reached that point.

It is time that you and I and everybody else stood up with some of the old fashioned independence of character and said that of these things we will have no more. The American federal government could to-day compel these different products, or base imitations which are operating so strongly to the destruction and injury of honest dairy products, to be sold and transported for just what they are.

Q. "If the Grout Bill should become a law, what effect would it have on the sale and use of oleomargarine in this State?"

Ex-Governor HOARD. It would have ten cents a pound effect.

Mr. BARTHOLOMEW. As companion question I would like to ask what effect will it have upon us if the Grout Bill does not become a law?

Ex-Governor HOARD. I think a good way to answer that question would be by a comparative statement. Those of you who have a copy of Hoard's *Dairyman* may have noticed a table on page 864 which, to me, is full of wonderful significance. From 1895 to 1900 there was an annual average of oleomargarine produced, of sixty-seven million seven hundred and seventeen thousand pounds. The production for the past year was 104,263,651 pounds. I now take the average price of the best butter per pound, and from 1880 to 1885 it was 29 and 33/100 cents. From 1895 to 1900 it was 19 and 24/100

cents. The average annual value of the product per cow as placed in this table is assumed as 200 pounds of butter per cow. Dividing the cow population by the number of people in the United States, as you will see, the number of people per cow from 1880 to 1885 was 4 and 50/100, and from 1895 to 1900 it had increased to 5 and 33/100. It therefore shows that there has been a constant increase or widening of the ratio per cow to the people. Now, the average oleo-margarine produced per year has increased in the past ten years from 59,314,248 pounds, the average from 1890 to 1895, to 67,000,000 in round numbers, as the average for 1895 to 1900. This statement shows that the introduction of a fraudulent counterfeit has had the same effect upon the dairy industry as it would have to destroy just so much of your industry. Now there is a position before us my friends that we ought to look at to-day. Turn right to that little table in the rear of the hall and see the evidence there of adulteration and fraud. It is stated that 25 per cent of the food production of the United States is adulterated. Now, what does that mean? It means that not only is the consumer defrauded, but it means that the farmer is injured, that is, that his business is injured to the extent of 25 per cent.

Now, they tell me that down in Georgia there is a peculiar kind of white clay which when ground looks very much like flour, and that they are turning it out by the car loads to be used in the adulteration of flour. I don't know whether Hale gets it into his peaches or not. I don't believe he does. But if that statement is true that the adulteration of food productions is destroying the business of agriculture by 25 per cent. it is certainly time that we commenced to look about us for a remedy to stop this thing. There is a story that the British government at the time of the Crimean war hanged seven contractors because they adulterated flour, and that stopped it. Anyway, those seven contractors didn't do any more of it.

An eminent physician has said that the remarkable growth of kidney disease in this country, Bright's disease, and all those things are largely due to adulteration of food and drink. The office of the kidneys is to expel poison from the system. They have all the work they want to do without introducing poison for them to expel, and break down in the effort. What must be the result when food and drink is impregnated with deleterious substances and poisons through adulteration. The kidneys are made of tender tissues, and the result will inevitably be that they must break down, and men are going to their graves in consequence of the mad efforts to make an extra dollar dishonestly. There is being a constant attack made upon the health of the people in order that some rascally man may make a little more money. We need to go back to the old days of American integrity, and we need it in politics and everything else.

Secretary GOLD. The announcement was made last evening that owing to the necessary absence of Dr. Atwater this afternoon we should expect to hear from him upon the subject of the Storrs Experiment Station at this time, so we give him fifteen minutes.

STORRS EXPERIMENT STATION.

Dr. ATWATER. The Storrs Experiment Station is a small institution. Its annual revenue is only a fraction of that enjoyed by a large number of experiment stations in the country. But, small as it is, fifteen minutes is wholly insufficient to even outline the work which it is doing. Therefore let me refer only to certain parts of the work. According to the last annual report, the kinds of experimental inquiry which are carried on may be classified as follows: Meteorological observations; experiments upon the effect of fertilizers upon the yield and composition of crops; dairy bacteriology; bovine tuberculosis; composition of foods and feeding stuffs; experiments on the food and nutrition of man.

Governor Hoard has just spoken in a very interesting and

forcible way of a fundamental principle, and in so doing he struck the keynote of the agricultural renaissance, of the intellectual uplift of the agriculture of our time. Those who are in the attitude of children are teachable. They are the ones who are being uplifted, and that uplift is being brought about by the increase of knowledge. Agriculture must be intellectual. Now, instead of going into details of what the Storrs Station is doing, I want to speak of that principle, and how the Storrs Station is helping it on.

The idea is this. For material progress as for intellectual progress, new ideas and new knowledge are necessary. These must be found out by research, and must be understood and applied by those in whose behalf the research is carried out. The knowledge of the laws that underlie the right principles of farming is fundamental. We need it not only for the better feeding of our crops and our cattle, but for the better nourishment of our minds. "Man by searching finds out knowledge." This is what the experiment stations are doing, and the farmers and the public at large are helping while they help the farmer and the public. With the application of that knowledge comes the uplift.

Now, to the point. I wish to illustrate to you one of the ways in which the Storrs Station is doing its share in the finding out of this larger knowledge. In so doing I wish to make it clear to you that we are engaged in the higher research, that which has for its object the discovery of law. I want to tell you of something of which I am a little proud as an indication that our work is appreciated by those who are best qualified to judge of the merits and the usefulness of the higher order of research.

At Middletown, where, as you know, the chemical and biological work of the station is carried on, we have just had a visit from Prof. Hagemann of Bonn in Germany. Prof. Hagemann is the head of an institute of animal industry lately established by the Prussian government. One of its chief pur-

poses is the study of the nutrition of animals. The government, through the minister of agriculture, decides what kinds of inquiry shall be carried on, and what money shall be made available for the purpose in such institutions. You know we have at Middletown, for the work of the Storrs Station, a respiration calorimeter by which we are studying the laws of the nutrition of man. It is in many respects new, and was the first apparatus of the kind. It is intended for experiments with men, but can likewise be used for experiments with other animals. When it had proved successful, the Pennsylvania Experiment Station, under the direction of Prof. Armsby, and with the co-operation of the U. S. Department of Agriculture, planned a similar apparatus for investigations with large animals, as steers and cows. Prof. Hagemann's object in coming to this country was to familiarize himself with the apparatus in order to have a similar one built in his institute at Bonn. In one of the conversations I had with him during his stay in Middletown, he told me how it came about that the Prussian government provided the means not only for the building of such a costly apparatus, but also for the defraying of the expenses of his journey to this country in order that he might learn about it and its working. He said, "I told the minister that if I was going to make a success of the study of the questions which he had submitted to me about the laws of the nutrition of animals, it would be necessary for me to take a step in advance of anything hitherto done. I must study the metabolism of energy in the body. I cannot answer questions as to the way food is used, as to the way the horse gets the most strength, or the cow the most butter out of its food, without such study. The minister said, 'Very well. Make your plans for such experiments,' and asked, 'What do you need for them?' I told him we must have the right form of apparatus, and to find out what is best it would be necessary for me to visit places where such inquiry was carried on. He gave me authority to do so, and I looked about in France,

Germany, England, and Sweden, and found what I could, also, about your apparatus in Middletown. When I saw the minister again, and reported what I had found out, I told him that we ought to have a respiration calorimeter, and that, in my judgment, the best form of that apparatus was to be found in the United States in Middletown, Connecticut. Some leading German specialists backed me up in this view, and the minister said, 'All right,' and so it was arranged that I should go to America and see the apparatus, and get plans for putting up one at Bonn. The money for the apparatus and the journey was appropriated, and here I am."

Dr. Hagemann went to the Pennsylvania Station and saw how Prof. Armsby was getting on with the apparatus which he is constructing, and also made us a long visit in Middletown, and saw our apparatus and some of our experiments.

The Austro-Hungarian government is making provision for similar experiments in the physiological institute lately established at Buda Pesth under Prof. Tangl. It has provided the money for the apparatus, and Prof. Tangl writes me that he hopes to make us a visit one of these days. Meanwhile he had arranged with Prof. Hagemann to get the results of his observations here, and also to obtain some of the parts of the apparatus which could be better made in this country than abroad, so that Prof. Hagemann ordered these in duplicate, one set for his own use in Bonn, and one for Prof. Tangl in Buda Pesth.

When Prof. Hagemann was corresponding with us before he came to this country, he especially requested that I should send him at the earliest possible moment a printed description of our apparatus. A bulletin describing it was then in the hands of the public printer in Washington, but was not yet published. The best I could do was to get some proofs, disfigured by the pen used in correcting them and by the inky fingers of the printers. I sent them, hoping that Prof. Hagemann would be able to get what he most needed out of them.

He told me that he sent these unsightly proofs along with a written report to Berlin where they served to enforce his argument in favor of the apparatus, and are permanently preserved in the archives of the Prussian ministry. They made part of the report on the basis of which Prof. Hagemann received his appropriation for his apparatus and his journey to this country.

Perhaps it is not seemly that I should thus manifest my personal pride in our apparatus and our experiments, but I speak the more freely because I am among my old friends. There are a number of us in this room who have worked together for more than a quarter of a century, you as farmers and I as a chemist, trying to do what we could in the aid of science and its application to agriculture, and I know that you, at least, will overlook the indiscretion and share the pleasure which I have in knowing that what we are trying to do has the most substantial approval of the experts, at home and abroad, whose approval is most valuable.

And I especially rejoice in the recognition which you, in your hearty support of our Experiment Station, give to the fact that the higher and more scientific research has really the greatest practical value. The broad recognition of this principle I conceive to be one of the most fortunate features of the progress of the experiment station movement in the United States. The knowledge this research brings is essential for our intellectual advancement. Such research is indispensable for the amassing of that knowledge which Governor Hoard has been telling us is so important for the every day practice on our farms.

But you are asking, "Just what is this experimenting for?" Let me tell you briefly. We are trying to find out how it is that the animal body makes use of its food. The principle is the same in the body of the man as in the body of the horse, the steer, or the sheep. Our work thus far has

been with man, but we are planning experiments with animals also.

I had some beefsteak this morning for breakfast. How am I using it? Somehow it is giving me strength and keeping me warm. Somehow our food enables us to put forth the intellectual effort by which I am trying to explain an abstract scientific principle to you and you are trying to understand it. Somehow or other the materials which build up our bodies, which repair the muscles as they are worn out by work, which give the muscles their strength, the materials which keep the body warm and supply its energy for work, — somehow these materials and the energy they contain are transformed in the body so as to supply its needs. Now, what are these transformations, and how are they done? How much of different materials, and how much of energy they supply, does the body of the animal or the man need for the work it has to do? This is what we are trying to find out. We are gradually coming nearer and nearer to the understanding of the facts. The subjects are very intricate. The experimenting is slow, tedious, and costly, but gradually it does bring out the facts.

One of the great scientific discoveries of our time is that of the law of the conservation of energy, the law which says that in nature energy is transformed, but not destroyed. In our experiments at Middletown we are trying to find something of the ways in which this law applies in the body. We put a man inside the respiration calorimeter. We give him certain kinds and amounts of food and drink. We weigh and measure and analyze the food and drink, and the products of their transformation in the body. Everything that goes into the body and everything that comes out is thus measured. Even the air which the man breathes is measured, and is analyzed before and after he breathes it so that we thus collect the products of respiration. We also measure the energy latent in the food and in the material which is transformed in the body. We likewise measure the energy given off from the

body in the form of heat and in the form of external work which the body does. We are thus enabled to compare the income and outgo of the body expressed in terms of matter and of energy.

If the law of the conservation of energy holds in the living organism, then the energy which was latent in the material transformed in the body ought to be the same in amount, as the energy given off from the body in the forms of heat and external muscular work. What do our experiments say? Do we find this agreement or do we not? When we average the large number of experiments already made, the result is surprising. Measuring the energy in heat units, or calories, we find that the average amount of latent energy in the material transformed in the bodies of the men averages 2453 calories, while that given off averages 2454 calories per day. This extremely close agreement of income and outgo is doubtless accidental. It is much closer than we have any right to expect from such experimenting, but it does show that the law of the conservation of energy holds, and it shows that we have an apparatus and method of experimenting by which we can accurately measure the income and outgo of the body.

Now, this last fact that we have a means for measuring the transformation of material and energy in the body, is an important one. We are thus enabled to study accurately the action of the fundamental laws of nutrition.

Let me give you an example of the way in which such study is practically useful. You farmers want to know about the nutritive values of feeds for your stock. We chemists make analyses and tell you the average proportions of the different kinds of nutrients, proteins, fats, and carbohydrates in different feeding stuffs, as hay, straw, corn fodder, bran, middlings, cotton seed meal, linseed meal and the like. The experiments in the laboratory and the stable have shown very clearly that to get the most economical results for our feeding, we want well balanced rations. The chemical analyses have

shown the composition of food materials, and have given the fuel values. But we chemists know just as well as you farmers that our analyses do not tell the story exactly. Somehow or other they do not always agree with your practical feeding tests. We find this especially the case with coarse fodders like hay, straw, corn stover, and the like. There is a discrepancy somewhere, and we have not found out exactly where it is, but this experimental inquiry in which we take account of the energy which is supplied by the food to the body is helping us to explain the matter. We are finding out now the answer to the question, How much energy does it cost to digest the food? The horse or the cow takes the fodder, digests it, and uses it. If digested the material has to be chewed, then it has to be transferred through the alimentary canal, materials have to be supplied by the body to the digestive juices in order to dissolve the materials so that they may pass through the walls of the alimentary canal, and be taken up by the circulation, and afterwards assimilated and utilized.

It has been lately found out that the cost of digestion of coarse fodders is much larger than we chemists formerly supposed. One of the leaders in this kind of investigation is Prof. Zuntz in Germany. Prof. Hagemann, of whom I spoke to you, has long been associated with him in this kind of inquiry. These gentlemen have made experiments with horses and other animals, and they calculated how much of the latent energy of the food is thus required to prepare it for use by the body. They find that the mechanical work of digestion of concentrated fodders, like meal, is comparatively small; but with coarse fodders, like hay and straw, it is very large. It appears to increase with the amount of what we call "crude fiber" or "woody fiber" in the food. With straw the expenses of digestion measured, in terms of energy, makes a considerable share of the total energy which the food furnishes to the body.

The chemists in the experiment stations have made a great many experiments with different feeding stuffs, and have found how much animals will digest from them. When the chemist tells the farmer that a large part of the straw is actually digested by his cows, and that consequently the straw has a good deal of nutritive value, the farmer is inclined to shake his head a little. The results do not agree with his practical experience. He knows very well that when his cattle are standing idle in the stall, he can use straw with some concentrated feeds and make it profitable, but he knows that for fattening or for making milk, coarse straw is rather poor fodder. Now, how does the later experimenting explain this? A considerable share of the total energy in the straw is required to digest it. But very little is left over for making fat or making milk or for doing hard work like hauling heavy loads. That means, then, that the nutritive value of the straw for producing meat or milk or work is not equal to what you would infer from the chemical analysis and the digestive experiment.

Nevertheless when the cattle are standing in the barn in cold winter weather and doing very little work, they need a good deal of food to keep their bodies warm, and somehow or other the straw does help them out. Our experiments with the respiration calorimeter help us to understand this. We find that all of the energy of the food which is not used for the external muscular work is transformed into heat in the body. That is to say, when the body has used the energy for the internal and mechanical work of chewing and of carrying the material through the alimentary canal, it does not throw that energy away, but transforms it into heat, and that helps to keep the body warm. The ox, standing in the stall in cold weather, actually gets the benefit of the energy of the straw by using it to keep his body warm, but it would not be very good fodder for the work of hauling hay to town.

When Prof. Hagemann told the Prussian Minister of Agri-

culture that he wanted a respiration calorimeter, he was thinking, I suppose, of the results of the experiments which he had made in association with Prof Zuntz. The apparatus which they had was not complete. It did not enable them to measure exactly the transformations of energy in the body. They found out a good deal about how much it costs to digest different food materials in the bodies of different animals, but they could not find out exactly. With an apparatus like the respiration calorimeter, these more exact results can be obtained.

Now I might give you many other illustrations of the ways in which experimenting of this kind is useful, but I have already used my fifteen minutes, and more. I hope, however, I have given you at least an idea of what we are doing, and shown you that the results have not only an educational but a very practical value.

AFTERNOON SESSION, 2 P. M.

Convention called to order at 2 P. M., Vice-President Seeley in the Chair.

Secretary Gold opens the question-box.

Q. Is it advisable to spray fruit trees when in full bloom.

Mr. HALE. It depends on what you spray them with.

Secretary GOLD. In any case should you spray them when they are in full bloom?

Mr. HALE. Ordinarily not, because you are likely to use some poison that is objectionable. That is the only objection I can see to it.

Secretary GOLD. If you used anything in spraying them wouldn't you be likely to affect the flower? Isn't the blossom very tender, and very apt to be injuriously affected?

Mr. HALE. It would depend on what you used.

Secretary GOLD. Yes, I understand that. You might use pure water, and if you did not put on too much of it, it might not do any harm, but if you used any of the variety of things used in spraying wouldn't it be likely to damage the tender organs of the flower? We are instructed not to spray during inflorescence on the theory that the bees will be destroyed. Now, the bees, we are told, are our best friends, and there is no doubt about that. We ought to be careful while the trees are even in partial bloom not to injure our friends.

The PRESIDENT. I would like to ask Mr. Hale to tell us when he considers the best time to spray trees.

Mr. HALE. It depends on what you are spraying for.

The PRESIDENT. Yes, but to prevent the destruction of the young fruit just after it is set.

Mr. HALE. Well, the whole question would be opened up there. Some people have an idea that they should spray any way without any definite idea of what they are spraying for. I have no sympathy with the idea of just spraying trees without any definite knowledge of what the trouble is, or what you are after, or what you are going to use. If you do not know what you are going to spray for you had better let the spray pump alone. If you are going to spray for any of the various fungus growths and their effect on the fruit, I should spray early in the spring before the buds are out with plain copper sulphate without any lime whatever, and, later in the season, just as soon as the blooms drop, with the Bordeaux mixture to which some specific poison is added to get at the insects. Then, too, it depends somewhat on the weather following that, whether you should repeat once again in two or three months, or, if there are frequent rains, possibly within two or three weeks following the first spraying. If that is the case you would want a second one, or it might be perhaps a third. Those are all local questions. Nobody can tell you what to do with your trees as to that. You cannot lay down any definite rule. You must find out for yourself.

Q. Does it pay to feed cotton seed meal at \$1.50 per bag?

Secretary GOLD. There is one element of uncertainty introduced into that question, and that is as to how large the bag of cotton seed meal is.

Prof. WOODS. I guess cotton seed meal always comes in hundred-pound bags.

Secretary GOLD. So I always supposed until recently.

Mr. HALE. The bulk of it comes in hundred pound bags.

Secretary GOLD. Well, the answer to that question would depend upon a variety of circumstances. If there is no one else going to answer it, I would say that a moderate amount of cotton seed fed to milch cows seems to have a very favorable effect upon the cream and butter product. Hence, fed with discretion, we consider it an admirable article to add to the ration for milch cows, and perhaps also for working oxen. Then also the question of the manurial value comes in as a very important element in connection with it. At a dollar and fifty cents a bag you are buying fertilizers about as cheap as you could buy them in any other way. We use it in our rations for our dairy stock.

Q. Is bovine tuberculosis increasing in this State or being stamped out?

Secretary GOLD. Is our cattle-commissioner here?

Mr. AVERILL. In answer to that inquiry, I can say there is no data by which we can determine exactly; it varies. Of course the work of this department is largely taken up with the inspection of suspicious cases. Farmers that have an animal of which they are suspicious send for the commissioner to come and examine the animal, and the results of these examinations vary greatly in the different months. The total number of animals condemned during the past year averaged but little over the number condemned during the previous

year. During the past two months more animals have been condemned than during any two months during the three years in which this department has been in existence, so that the only answer that I can give to that question is that we do not know.

I would like to say just one word in regard to the question that appeared in the box this morning. As I remember it the question was whether close barns were a cause of tuberculosis? Our worthy Secretary said no, but they were good breeding places. Now, that is, perhaps, hardly true, but I will not say that. I hardly agree with it, and I hardly disagree with it. I believe that cattle should be treated or subjected to the same hygienic conditions as the human race. Now, would any one ask if warm houses are the cause of consumption in the human race? — that is one of the forms of tuberculosis. Now, I do not believe there are any of us who would advocate going back and building our houses as they were built years ago, when through the crevices and cracks snow would drift in. I believe that warm barns are just as essential for the most successful dairying as warm houses are for the comfort of ourselves or our family. What would we think of a man who, in the morning after he had eaten his breakfast, would compel his wife or his daughter to go out of doors in the same apparel in which they were clothed in a warm room, and drink a few glasses of water, and then stand around until about 4 or 5 o'clock in the afternoon exposed to the bleak winds of a winter's day. I believe that any man that would do that himself would take such a cold that it would reduce his vital energy to such an extent as to make him susceptible to tuberculosis. I believe that the same condition exists in regard to our cattle. I don't believe that tight barns, or warm barns scientifically ventilated, tend to produce tuberculosis if the cattle receive proper care, and if common sense dictates the management of the dairy as it does in our own experience; I

don't believe that warm barns are even breeding places for tuberculosis. I don't believe that warm barns will cause tuberculosis any more than the turning of cattle out from a warm barn and exposing them to the weather will cause tuberculosis in itself. Common sense should be exercised in all these things. I believe that anything that will reduce or lower the vitality or the vital energy of a cow will make her susceptible to the disease. I think that the same consideration of hygienic conditions should be taken into account by the dairymen in his care of his stock that we take into consideration in our personal experience and in the protection of our families.*

A MEMBER. I wish Mr. Averill might state the locality where he finds it.

Mr. AVERILL. I would a little rather not do that.

A MEMBER. Well, perhaps, that is not necessary, but I would like to know whether it is more marked in any particular locality.

Mr. AVERILL. I don't know that there is any marked difference in any section of the State. It is more or less in all parts of the State.

Ex-Governor HOARD. It isn't very alarming, is it?

A. No, not to my mind.

Q. What is the best strawberry for market?

Secretary GOLD. Mr. Hale, how many times have you been asked that question this last year?

Mr. HALE. Several thousand.

Secretary GOLD. Well, let us hear your conclusion of the whole matter.

* NOTE. The Commissioner and the Secretary do agree as to the cause and spread of tuberculosis, whatever discrepancy may appear in the careless use of language. This is confirmed by study and experience on our part for over thirty years. At that early date we had to collect and study our own facts and draw our own conclusions. The acceptance of the truth in regard to tuberculosis by all who have to do with cattle and with human life and health will be the most potent factor in its control, with hopes for its entire extermination.
T. S. G.

Mr. HALE. I don't know. That is a local question always. Strawberries come and go. They are affected by blast or rust which makes our most valuable strawberries of five years ago worthless now. Strawberries are very uncertain in their continued value. What was the leading market strawberry five years ago is scarcely grown at all now. A berry that is the most profitable to one grower on sandy soil in New Haven County would be unprofitable to another grower on heavier soil in some other county. There is no one variety that is profitable everywhere. Perhaps the old Haverland which we have had for twelve or fifteen years, perhaps that was more largely grown up to a year or two ago, but it is now failing in foliage, and the Buback, which we also advocated eight or ten years ago from year to year, increased on certain heavy soils its productiveness, and has been a profitable berry, but there is no one profitable market strawberry above all others. There are a few of the standard kinds that you must pick out for yourself according to the soil in your locality, etc.

Secretary GOLD. Cannot you name half a dozen, Mr. Hale?

Mr. HALE. For the sandy soils of our State, probably the Clyde is a well adapted berry. It is better adapted to that class of soils than to heavier land. Then there are one or two other well-known kinds which are adapted to light lands. Perhaps those are the most profitable berries for sandy soil. On medium soils I think, perhaps, you might say the Glen Mary is as good as any. It is a berry of exceeding productiveness, and is a rich dark red in color. The Clyde on some soils is probably the most productive, but it is inclined to be light colored, and is objected to by many on that ground. On other places it is apt to set so many fruit stalks that there is no room left. That is an objection to it in the minds of some. It is probably one of the most productive strawberries that we have. That may injure the size in some places. For

our heavier soils the Glen Mary might be mentioned, also the Cumberland.

Q. Do we need to spray our grape vines every year for the black rot?

Mr. HALE. Yes. At the same time there is more or less fungus growing on the vines that needs to be taken care of, and the same mixture which is used to get rid of the black rot also helps to prevent this fungus growth and to make a healthier foliage. I think that spraying with Bordeaux mixture is essential to success. If there was more of it done we would have better crops. We ought to grow more grapes in Connecticut, and instead of having hundreds of tons come into our State from outside we ought to grow them here ourselves.

The PRESIDENT. What kinds shall we grow for variety.

Mr. HALE. There are a few good standard kinds such as the Worden, Concord, and Niagara.

Mr. PLATT. I suppose that the Bordeaux is a thing that kills out fungus, but so far as the black rot itself is concerned in the grape, if your grape vines are free from it, I have found that a period of several years intervening does not do any harm. If you once get rid of the black rot I don't see any need so far as that is concerned of spraying in those years.

Q. What has been your experience with peach yellows; I mean in controlling the disease?

Secretary GOLD. The State got tired of trying to control it, and left it entirely in the hands of the growers. Some of them, doubtless, have been more thorough and successful in controlling it, but there are a lot of neglected trees, and trees that are going to destruction, and leaving their seed behind them. What do you think about that, Mr. Hale?

Mr. HALE. My observation has mostly been gleaned from commercial orchards — the large commercial orchards of the State — and from what I can see from the cars and near the roadside as I travel about. I think our more intelligent

growers or our more earnest growers who have, perhaps, the best success in peach growing are taking care of this evil by promptly pulling out diseased trees on the appearance of the disease. They are also encouraging small growers or farmers and landowners in their immediate neighborhood to pull out the diseased trees, and in their immediate neighborhood they are keeping the yellows under control in that way. On some farms they are pulling up and destroying the trees, and in certain localities the trouble is being kept in subjection in that way. In other localities there is not particular attention being paid to it. In private gardens, as in the smaller orchards, one hundred or two hundred trees, perhaps, the yellows has spread galore. It is all over the State, and there are thousands upon thousands of trees that are going to do great damage to their owners and to the neighborhood and to the peach industry as a whole. It will probably continue to spread. It will do thousands of dollars worth of damage to one of the greatest industries of our State, and one of the most paying industries at the present time for the capital invested. It has always seemed to me that the State took a step backward when it stopped the expenditure of a little four or five thousand dollars a year instead of continuing to fight against this trouble. It has resulted in a loss of several hundred thousand dollars a year to the State.

Right in the same line we are having difficulty with the San José Scale. Many of us have not yet discovered it on our own trees, but it is being discovered in about every town in the State, and it is a disease that not only kills peach trees, but apple trees and a great many others. When it once gets into a locality it soon spreads through the neighborhood. We ought to have a commission whose duty it should be to go through and spray those trees, or pull them up and burn them. Some day we will awaken to the fact in this State that we have been too late in the proper treatment of these

matters. Instead of taking a step backward the State should have taken a step forward.

Q. Are the buds hardier on fruit trees situated out on the northern slope, or top of a hill, than those set in the valley?

Mr. HALE. I don't know any more about these things than a great many others here. Why, no. I don't know that buds are any hardier on trees set on the northern side of a hill than on the south side or in a valley, but the conditions are different on top of the hill. And the same buds will live better through certain cold weather on top of a hill and on the north side of the hill where they might fail on the south side or in the valley. Frost runs down hill just like water, and it will run down into the valley. There is a difference in the temperatures between the top and lower down. It may be just enough to affect the bud.

Q. How should we exterminate cattle lice?

A VOICE: Spray them.

President SEELEY. I should like to know about that myself. What mixture should we use?

Secretary GOLD. A very little mercurial ointment judiciously applied, so that the animal cannot lick it off or eat it will destroy vermin on cattle, and with no harm to the cattle, provided you shield them from cold and wet. It seems to be perfectly safe judiciously managed, but it is a most dangerous tool in the hands of ignorance or carelessness.

The PRESIDENT. Our next lecture upon the program is by Professor Woods of Orono, Maine. Professor Woods used to be in Connecticut. His subject is "Experimental Inquiry as to Milk Secretion."

Professor WOODS. Mr. President and gentlemen: I ought not to take the time perhaps to break off this very interesting discussion to stop to read the paper which I have written. I accepted the invitation of the Secretary, however; I could not resist the temptation.

When I started to take in hand the matter and prepare myself on the subject which I am going to speak to you about, I hadn't the slightest notion that I would find my hands so full or the data so extensive. The subject is a great deal broader one than I thought. In the paper which I have prepared I have tried to cover the ground as it is, and I offer no apology at this time for bringing the facts in full before you. I have come to the treatment of this subject in very much the same attitude of mind as a judge would review the evidence. It is my purpose at this time to bring to you what I believe the latest data and information concerning experimental work which is being done in this line to-day. It was not adapted to work in this line ten years ago, and it may not be ten years from to-day, but up to the present, I believe, it presents an up-to-date view of the subject.

RECENT EXPERIMENTAL INQUIRY UPON MILK SECRETION.

CHAS. D. WOODS,

Director Maine Agricultural Experiment Station.

To the dairyman, all that is of practical importance in milk secretion centers around the quantity and the quality of the milk. Experimental inquiry has been very active along these lines during the past ten or fifteen years, and the chief embarrassment in attempting a summary of what has been undertaken and the results which have been obtained is the abundance and the variety of the data. The station publications are replete with such results, and in the paper which follows the attempt is made to put in a compact and easily-to-be understood form the more important conclusions which have been reached, and some of the data upon which they rest. Desirable as it would be to insert references as to the authorities quoted, the limits of a popular paper will not, for the most part, allow of such reference, and, for the most part, quotation marks are also omitted.

THE UDDER OF THE COW.

The udder of the cow consists of two glands lying horizontally side by side, separated by a layer of tissues which help to support them. The glands are distinct from each other, as may be noted by examining the under side of the udder where the furrow separating them will be found. Each gland ordinarily has two teats on its lower side through which the milk may be drawn from that particular gland. Each of the four teats draws the milk from what is usually termed a "quarter" of the udder. The two teats on the same side of the udder are from the same glands. As the glands are distinct from each other, so, in a measure, are the "quarters." For example, it frequently occurs that cows have garget in one "quarter," while the other teat from the same gland milks freely, and appears healthy.

If an udder be dissected it appears somewhat spongy and pinkish, having numerous holes or canals, much like a sponge. When cut, milk escapes from the incision. Within each teat is a cavity from which the milk is drawn through the teats. At the lower end of each teat a small muscle encircles the outlet to prevent the escape of the milk. Each of the glands of the udder is composed of a quantity of structure somewhat resembling a bunch of grapes. That which may be considered to represent the bunch is called the lobe, the lobule corresponds to one grape, and the alveoli are smaller glands or ducts within the lobule. The alveoli are exceedingly small and can be seen only under a microscope of high power.

The actual secretion of the milk goes on in the alveoli. Exactly how the milk is secreted is not known. It is usually supposed that the process of milk secretion is two-fold. That one is a breaking down of the cells in the alveoli which form the fat of the milk, and the remainder of the process is purely a secretive one, much as saliva is formed in salivary glands. The assumption is sometimes made that in the milk glands of the cow there are as many different and more or less independent forces at work as there are constituents of the milk, and that each of these forces provides for the formation of a single constituent of the milk. A theory which seems to have a greater acceptance at the present time is that the milk glands are possessed of forces which are first of all directed to the form-

ation of milk fat, and the other milk constituents, casein, milk sugar, mineral matters, etc., occur in a sense as by-products.

Bearing upon the above, it is a well-known fact that as the period of lactation advances there is a marked diminution in the activity of the milk glands, and this affects the secretion of fat proportionally less than that of the other milk constituents. It is also well known that fluctuation in the regular flow of milk during lactation usually more largely affects the secretion of fat, and it is also frequently observed that to a certain extent the milk yield seems to be determined by the relative tendency of the milk glands to secrete fat.

However the milk may be secreted in the alveoli, it seems to be well established that the milk finds its way through channels of the alveoli into the lobules, and from there into the lobes, and thence into the ducts where it is conveyed into the milk cistern above the teats.

THE MILK VEINS.

The nervous system of the cow is closely associated with the production of the milk. When the teats are stimulated either by the hands or the sucking of the calf, the nerves surrounding them become irritated, and through these the nerves of the secreting glands within the udder are excited, causing their contraction and the discharge of their contents. The action of the blood vessels and veins is affected by the activity of the nerves; ordinarily the greater the capacity of the arteries and veins connected with the udder, the larger the milk secretion will be. This shows the importance of securing cows with a strong development of the arteries or veins of the udder and abdomen. An examination of the belly of a good dairy cow reveals thereon, extending from the udder along each side, a milk vein one-half inch or so in diameter. The milk veins, at the point most distant from the udder, pass through what are called the milk wells in the walls of the abdomen. These openings through which the veins pass should be of good size so as to permit a strong flow of blood through them. As a rule, the greater the milk secreting power of the cow, the larger and more twisted of outline will these veins be.

While experts are able to judge from the general build of a cow much as to her capacity as a milker, the various rules or "points" which have been laid down for judging the merits of milch cows are of themselves uncertain. While the form of the udder is important, as also the size of the milk vein, a large well-formed udder is not always a sign of productiveness.

The best cow in the Province of Brandenburg, Germany, as shown in milking trials lasting for a year, was small and unsightly in appearance, and gave no external indication of so great productiveness. While the characteristics of the dairy cow, as regards conformation, temperament, etc., are helpful, intelligent breeders and feeders are exacting from their cows, at least a certain yield of milk per year of quality that will assure them a profit in their keeping. The use of the scales and the Babcock milk fat testing apparatus is of far greater value for determining the capacity of a cow than all the milk "signs" imaginable.

THE NUMBER AND SIZE OF FAT GLOBULES.

The fat is secreted in globular form, and the size of the fat globules in the milk are of great practical importance, since, as a rule, the larger the globules, the cleaner will milk skim and cream churn. Studies on the number and size of the globules show that as a general rule there is a steady increase in number of the small globules and a decrease in the large globules as the period of lactation advances. From tests made in fractional milking it is learned that there is an increase in the number and size of the fat globules from the beginning to the end of milking.

There is an almost incomprehensible rapidity in the secretion of the globules. Assuming the milk secretion to proceed uniformly throughout the day, in the case of twenty-three cows, each giving a little less than twenty pounds of milk, there was an average secretion of 138,210,000 globules per cow per second. A study of the size of the globules at the Pennsylvania Station showed the relative size of the globules to vary more uniformly with the total yield of milk than with any other factor. In general, a decreased milk production is accompanied by a decrease in the average size of the globules.

and an increase in milk production from any cause is accompanied by an increase in the average size of the globules. The influence of the quality and the quantity of food upon the size of the globules appears to be indirect, the real cause being the variation in milk production. If this is true, and the hypothesis is well supported by observations, the method of feeding so as to produce the largest globules is the same as that required to produce the largest possible yield of milk consistent with keeping the cow in a normal condition.

IS THE FAT OF MILK A SECRETION?

Until recently the formation of fat has been commonly regarded as a result of a degeneration or breaking down of the epithelium cells of the gland. It has recently been shown that from the construction of the cells this position is untenable and that the formation of fat is not due to fatty degeneration but rather to an infiltration of fat which the cells extract from the circulating supply of blood and lymph. The cell secretes or separates the fat itself by extracting it out of the fluids furnishing it and no breaking down of the cells takes place. This is not a mere transudation of the fat, as it may be and usually is very materially changed in character by the alveoli.

THE REGULARITY OF MILK SECRETION.

With the idea that the fat of milk was the result of breaking down the cells themselves, the thought that milk formation went on more largely at the time of milking than at other times was common. In experiments with Holsteins, Jerseys, Guernseys, and other dairy breeds, when the cows were milked at intervals of twelve hours each, it was found that the weight of milk secreted from 5 P. M. to 5 A. M. was the same as that secreted from 5 A. M. to 5 P. M. The average amount of milk in these trials, and its composition, is shown in the following table:

	Morning's milk.	Night's milk.
Yield,	700 lbs.	696 lbs.
Water,	86.25 per cent.	86.39 per cent.
Solids,	13.75 " "	13.61 " "
Fat,	4.26 " "	4.22 " "

This and similar studies upon the uniformity of milk secretion seem to warrant the belief that the milk is formed continuously and uniformly. The flow of milk at the time of milking is usually much greater than the capacity of the milk cistern, but this is readily accounted for, as the irritation of the nerves causes the contraction of the wall of the glands and milk ducts.

THE SOURCE OF THE FAT OF MILK.

As long as the theory that fat of milk was formed from the fatty degeneration of the milk gland, and that it was not a secretion, prevailed, it was thought the fat of the milk could not be directly derived from the fat of the food. Many experiments seemed to conform to this view, and it was consequently generally held that the fat of milk was derived from body fat. At the same time it was held by many that the supply of fat in food was always sufficient to more than account for the amount of fat in the milk secreted. The predecessor of the present director of the New York Station compared, in the case of a large number of cows, the amount of fat in the milk with that in the food, and concluded therefrom: "It would seem that until strong proof shall be submitted that the fat of milk is derived from other constituents of the food its source at present must be held as the fat present in the food of the animal."

In experiments with a dog fed in different periods with nitrogenous and carbonaceous rations to which fat treated with iodine was added, it was found that a very considerable amount of the iodine fat was transmitted to the milk. In one case twenty-three per cent. of the fat of the milk was iodine fat, while in a period immediately following, in which no iodine fat was fed, six per cent. of the milk fat was iodine fat, which must have been derived from the body supply. These experiments indicated that body fat may be drawn upon for the production of milk fat, but that under like conditions the fat is more likely to be derived from the food fat.

By investigation it has been clearly shown that both protein and carbohydrates of food might be the source of body fat. The experiment which seems to indicate clearly that the carbohydrates may also be the source of milk fat was

made by the present director of the New York Station, and it is so important in its bearing on this question that a quite full abstract of the experiment is here given.

A cow fed during ninety-five days on a ration from which the fats had been nearly all extracted continued to secrete milk similar to that produced when fed on the same kinds of grain and hay in their normal condition. The yield of milk fat during the ninety-five days was 62.9 pounds. The food fat eaten during this time was 11.6 pounds, 5.7 only of which was digested; consequently at least 52.7 pounds of the milk fat must have had some source other than the food fat.

The milk fat could not have come from previously stored body fat. This assertion is supported by three considerations: (1) The cow's body could have contained scarcely more than sixty pounds of fat at the beginning of the experiment; (2) She gained forty-seven pounds in body weight during this period of time with no increase of body nitrogen, and was judged to be a much fatter cow at the end; (3) The formation of this quantity of milk fat from the body fat would have caused a marked condition of emaciation, which, because of an increase in the body weight, would have required the improbable increase in the body of 104 pounds of water and intestinal contents.

During fifty-nine consecutive days 38.8 pounds of milk fat was secreted and the urine nitrogen was equivalent to 33.3 pounds of protein. According to any accepted method of interpretation, not over seventeen pounds of fat could have been produced from this amount of metabolized protein.

As to the source of milk fat, the conclusion is reached that in these experiments the milk fat was produced, in part at least, from carbohydrates, as previous experiments have demonstrated to be the case with body fat.

The quantity of milk solids secreted bore a definite relation neither to the digestible protein eaten nor to the extent of the protein metabolism. The extent of protein metabolism seems to be influenced mainly by the protein supply rather than by the quantity of milk solids secreted.

Neither a deficiency in the protein of the ration nor a depression of the digestible nutrients to about 5.5 pounds per day caused the cow to produce poorer milk. The only apparent effect was in changing the quantity of product. The

changes in the proportion of milk solids were due almost wholly to changes in the percentage of milk fat.

THE RELATION OF THE NERVOUS SYSTEM TO MILK PRODUCTION.

Can the brain or nervous system of a cow affect her yield of fat and, if so, in what ways and to what extent, is the interesting question that has claimed the attention of many investigators. That cows have more or less power to "hold up" their milk is well known, but to what extent she may at will affect the actual secretion is not so clear. A comparison between the amount of milk drawn from a cow by a man and a calf was quite largely in favor of the calf. When cows are milked one teat at a time, both the yield and quality, at least for short periods, are decidedly affected. The yield of fat in such trials fell off from one-fourth to one-third of the yield when milked in the usual way (both teats from the same gland at the same time). Tests made upon these subjects indicate that change of milker, manner of milking, and change of environment all exert a more or less decided influence, temporarily, at least, on the quantity and quality of the milk produced, the fat being as a general rule more sensitive to such changes than the other ingredients or the total yield of milk. In tests in which cows were milked in from three to four minutes and double that time, the yield of milk seemed to be very little affected, but in every case richer milk was produced when the cows were milked fast than when they were milked slowly. Many studies by different investigators on the effect of the frequency of milking and the studies of fractional milkings seem to justify the following statements:

The secretion of any single ingredient, as fat, is not affected by the act of milking.

No considerable formation of milk takes place during milking.

Too frequent milking and allowing the milk to remain in the glands too long both tend to diminish the secretive activity of the glands.

The process of milking in itself is without effect on milk production. Frequent milking, within certain limits, may result in an increased production of milk, not through the act of milking itself, but through the emptying of the glands.

EFFECTS OF TEMPERATURE AND WEATHER ON MILK SECRETION.

The effect of warm quarters upon milk production is uncertain. In a warm stable there is rather more milk and butter fat, on the average, than in an unwarmed stable, but in the climate of New England the increased production will not nearly pay the cost of heating. The most certain effect brought out by these experiments is the lowering of the percentage of fat in the milk in the warm stable. With moderate artificial heat, better ventilation can be secured, without making the stable too cold for the comfort of its occupants, than is possible without artificial heat.

In experiments upon the effect of warming the water used for cows, it was found that there was an increase of five to eight per cent. in yield of milk and butter fat with water at seventy degrees F. on that at thirty-two degrees. On the average, more warm water was drank.

From studies upon the effect of weather upon milk production, with many animals, over long periods of time, the following summary fairly represents the case:

There seems to be a general tendency of the quality of the milk to become richer in fat content when the temperature is falling, and less rich during a rising temperature.

Concerning the changes in the milk occurring simultaneously with storms, if these changes are considered to be due to the effect of rain storms, they seem to indicate that cows in flush of milk on pasture feed give as much or more milk, and of just as good quality, in bad weather as in fair weather, and that when the storm is over they give a less quantity of richer milk. The cows do not appear to make any change in quantity or quality of milk on the approach of a storm, and no connection is traceable between the storms and the pounds of butter fat produced.

EFFECT OF EXERCISE AND FATIGUE ON MILK PRODUCTION.

It is found that with moderate work (not exceeding two hours a day) the yield of milk is decreased, the decrease being due to a decrease in the water content of the milk, as the milk was more concentrated when the cows were worked. The principal effect is on the percentage and total amount of fat, both of which are increased. There is a decrease in all

of the constituents of the solids except the fat, and especially in the case of milk sugar. Seven German experiments are reported in which a number of cows were driven a considerable distance, in some cases up a mountain, and the milk analyzed for a number of days before and after the trip. These experiments were made on different cows, in different parts of the country (Germany), and under varying conditions. They all showed that heavy exercise influenced both the quantity and quality of milk. The quantity of milk diminished, and also the absolute amount of milk constituents. This decrease was more or less noticeable in the first milking after the trip, according to the severity of the exercise, and was much more noticeable in the second milking. The water content decreased in the first milking and more in the second milking, then gradually returned to the normal. The casein content increased in the first milking, remained about the same in the second milking, and then gradually sunk to the normal. The fat content was much increased in the first milking, according to the severity of the trip, was still larger in the second milking, and then gradually sunk to the normal. The sugar content decreased in the first milking, and usually rose again to the normal in the second and following milkings. The ash content was noticeably higher in the first milking after the trip, and then sunk to the normal.

In two cases the effects of fatigue are reported where ten cows were driven ten miles and shipped fifty miles by railroad. While considerable individual variation was observed on the average, the quantity of milk was lowered as an immediate result, but normal flow was nearly restored by the end of the second day. The fat percentage dropped during the first day and was decidedly increased the second day, remaining a little high during the next few days, as compared with the flow of three weeks later. Solids not fat averaged about the same, except for the second milking. "It seems safe to conclude, as a result of the two tests, that fatigue tends to lessen the milk flow temporarily, to affect variously its quality for the first one or two milkings, and to raise the quality for a while after the second milking."

The above-cited results all agree in pointing out that causes and circumstances affecting the nervous system have marked effects, at least temporarily, on milk secretion.

Usually circumstances which affect the animal unpleasantly decrease production. In these cases the fat is the constituent most considerably affected. Most of the experiments upon this class of subjects are of short duration, and there seems to be a tendency under longer continuation of the conditions for the cows to adapt themselves to the change and gradually return to their usual secretion of milk.

COMPOSITION OF AND VARIATIONS IN QUANTITY AND QUALITY OF MILK.

As is well known, milk consists of water, casein, and albumen, fat, milk sugar, and mineral matters. The exact amounts of these different constituents in case of different herds, periods of lactation, vary within wide limits. As has been stated several times in this paper, the fat is the most variable as well as the most valuable of these constituents. So far as the quantity and quality (as measured by the butter fat) is concerned, the following statements seem to be justified by observations which have been made with a large number of cows of many herds for numerous periods of lactation.*

All cows shrink in quantity of milk as they get farther from calving. If they are farrow, this shrinkage in quantity is accompanied by almost no change in quality, even until they go dry, provided they are still farrow. If they are in calf, the milk increases in quality as it decreases in quantity; this increase is slight, only one-twentieth during the first six months after calving, but becomes quite pronounced just before the cow goes dry.

The milk of a cow for the first few days or weeks after calving is very variable in quality. On the average it is thinned just after calving, becomes slightly richer during the next two weeks, and then holds almost uniform in quality for the next four or five months.

Cows vary in the quality of their milk from one milking to the next, and from day to day, the quality rising and falling without apparent cause. Such changes are usually within one per cent. of fat, but it is probably possible that cases may occur of a doubling in the richness of the milk during different times in the same period of lactation.

*A quite full discussion of this subject can be found in the report of the Vermont Station for 1895, pp. 157-186.

The following illustrates the variation in percentage of fat which may occur in the milk of cows from day to day: The morning's and night's milk of a Jersey cow was analyzed on eight consecutive days, the food, environment, and time of milking being exactly the same each day. The highest percentage of fat found was 5.38 and the lowest 4.45, a difference of .87 per cent. The variations which may occur from day to day in the composition of the mixed milk of a herd are illustrated by analyses of the mixed milk of a herd of thirteen cows for a period of thirty-two days. The percentage of fat ranged from 3.63 to 4.59, an average of 4.19, and the amount of fat from 6.48 to 11.78 pounds per day.

Just after calving, the milk is poorer in fat, and in solids not fat, than just before the cow goes dry. Most cows give about the same quality of milk year after year, beginning with this quality at the first calving. There is no general tendency for the milk to become either richer or poorer as the cow grows older.

From one calving to the next, cows may be expected to vary the general quality of their milk not much more than a sixth of one per cent. of fat, and scarcely ever will show an average variation of more than a quarter of one per cent.

EFFECT OF FOOD ON QUANTITY OF MILK.

There is a unanimity of opinion by practical men and scientific men alike that the food has a greatly determining effect upon the quantity of milk secreted. Feeding an insufficient ration under otherwise like conditions always decreases the amount of milk secreted. Abundant experiments indicate the importance of maintaining a proper ratio between the flesh-forming (protein) constituents of the food and the energy-producing constituents (the fats and the carbohydrates). The standard prepared by Wolff calls for each 1,000 pounds of live weight 2.5 pounds digestible protein and sufficient digestible carbohydrates and fats so that the ration shall have a nutritive ratio* of 1:5.4. The standard suggested by the Wisconsin Experiment Stations calls for 2.15 pounds digestible protein and sufficient fats and carbohydrates to

*The nutritive ratio is the ratio of the protein to the fuel constituents of the food, and is found by dividing the sum of the weight of the digestible carbohydrates and two and one-fourth times the weight of the digestible fat by the weight of the digestible protein contained in the ratio.

make a nutritive ratio of 1:6.9, and the Storrs Station suggests a ration containing the same amount of digestible protein (2.5 pounds) as the Wolff ration and slightly more digestible fats and carbohydrates so that the nutritive ratio is 1:5.6. Just what the size of the ratio should be and what its nutritive ratio, in order to get the best results, is a matter of uncertainty, but that the size of the ration and its nutritive ratio are the determining factors on yield of milk is generally accepted. It seems to be well established also that dry fodders do not give as large a milk flow as succulent foods. At the Halle (Germany) Station it has been found that the milk flow increases regularly with the increase of watery foods until the water is carried above 100 pounds per 1,000 pounds live weight a day. To avoid misunderstanding on this point, it should perhaps be added that the results of experiments against feeding meals wet up with water ("slops") seem to show decrease in the milk yield without affecting the quality of milk. In the case of cows changed from barn to pasture, it has been repeatedly found that there is a marked increase in milk flow notwithstanding that most of the herds had grain while in the barn and none while on pasture. The increase which comes when the pastures are dry in the late summer from the feeding of corn fodder are marked and well known. Time and space will not permit a summary of the work along the lines of the effect of food upon the quantity of milk secreted but the following results are typical of the reports of most exact feeding tests on the subject:

EFFECT OF RATIONS OF VARYING NUTRITIVE RATIOS ON THE SECRETION OF MILK.

The animals were fed in four periods. First the nutritive ratio of 1:8.2, second the nutritive ratio of 1:5.4, third the nutritive ratio of 1:4.3, and fourth the nutritive ratio of 1:8.2, the same as the first. All three rations contained practically the same amount of dry matter and very nearly equal amounts of digestible non-nitrogenous matter. Cows were milked three times daily and daily analyses made of the mixed milk of each cow. There was little variation in weight from day to day. There were no changes in the percentages of fat which could be attributed to changes in the food. In the

amount of milk and the total amount of fat there were marked changes.

In the case of each cow the absolute yield of milk and fat increased with the increased protein consumption, this being greatest with the change from the first to the second ration. When in the fourth period the cows were changed back to the wider ration, they all shrunk in the yield of milk and fat.

There was a gain in weight on the rations of the second and third periods, and a loss on that of the fourth period. The results show that it is possible by rich feeding to maintain a yield of milk and fat well up to the end of the period of lactation, and that on the whole, liberal rations, and especially rations richer in protein than Wolff's standards, were the most advantageous.

LEHMANN'S STANDARD RATION FOR MILCH COWS.

The experiments in this country and abroad seem to indicate that for the production of milk there is need of a liberal proportion of protein in the food. Just why so much protein is necessary, physiology is not yet able to clearly explain. It has been suggested that the influence upon milk secretion of an abundant supply of digestible protein in the ration is due to the influence of protein upon metabolic activity rather than because so much is needed to form milk solids. Whatever the explanation, the fact seems fairly well established that a liberal supply of protein is favorable to increase in the amount of milk secreted.

The feeding standard prepared by Wolff thirty years ago was modified by him from time to time in accordance with the teachings of experience and experiment. Recently Dr. Lehmann has made changes in this standard for milch cows so as to provide rations fitted to the actual milk production. In these standards he has made the ration narrower as the amount of milk secreted is larger. The standard rations as prepared by Dr. Lehmann for cows per 1,000 pounds live weight with different milk yields are as follows:

Milk per cow per day.	Protein.	Fat.	Carbohydrates.	Nutritive ratio 1.
11 lbs.	1.6 lbs.	.3 lbs.	10.0 lbs.	6.7
16 "	2.0 "	.4 "	11.0 "	6.0
22 "	2.5 "	.5 "	13.0 "	5.7
27 "	3.3 "	.8 "	13.0 "	4.5

EFFECT OF FOOD ON QUALITY OF MILK.

The question of the effect of food upon the composition of milk has called forth a variety of opinions and much experimental work and is at present regarded by many as unsettled. In the opinion of most investigators, after a certain point is passed, food is only of secondary importance and the quality of the milk depends upon the natural capacity of the animal and the glands for secreting milk. By some investigators and by many practical feeders this point is not considered as settled.

CAN THE PERCENTAGE OF FAT IN MILK BE LOWERED BY
SCANTY FEEDING?

In the case of short periods (ten days to three weeks) the results of the experiments seem to be entirely consistent with the conclusion that scant feeding or the feeding of unbalanced rations exerts an entirely insignificant influence on the fat content of milk. The results of all these experiments which have come to my notice are summed up in the following conclusions of one such test:

The animals were fed for two weeks on rations which were insufficient. The cows lost in weight, and in some cases there was a slight shrinkage in yield of milk, but the composition remained practically unchanged, indicating that it is the flesh of the animals that first declines when the aliment is insufficient.

In the case of long-continued, scantily and poorly-balanced feeding, it seems to be clearly established that the fat content of the milk may be materially reduced below the normal. This is illustrated by observation upon cows in Norrland. During the period from January to May, Norrland cows are in general fed only a meager allowance of marsh hay and are therefore in a very poor condition when turned out to pasture in June. The results of about 2,000 analyses of these periods of feeding show that on rich pasturage their milk carried from 2.65 to 5.8 per cent., with an average of four per cent., of butter fat, and that on scant stable feeding the milk carried from 1.10 to 4.6 per cent., with an average of 3.25 per cent., of butter fat. In discussing these results, the author

concludes that the fat content of milk cannot be increased at will by increasing a normal ration, but, on the other hand, that it can be greatly decreased by scant and poor rations. If a change is made from a deficient to a normal ration, the fat content of the milk will again be raised to the limit determined by the inherent qualities of the individual cow. This point is more or less generally accepted and is of practical importance in the case of ordinary feeding only, as it indicates that cows may be below their normal for some reasons, and that a proper ration may apparently increase the percentage of fat, when in reality it is only bringing the animals up to their normal quality of milk.

CAN THE PERCENTAGE OF FAT BE RAISED BY LIBERAL FEEDING?

Up to the publication of a paper by Soxhlet in 1896 there was little diversity of opinion among American investigators on this subject. It was generally accepted that the addition of nutrients to an already normal ration would not increase the percentage of solids in the milk or the percentage of one or more of the constituents of the solids. Hundreds of feeding experiments with cows on different rations have been made in which the milk has been analyzed and exact records of the percentages of fat have been kept. These tests have been made with all kinds of feeds and with a very general agreement that changes of feed when cows were previously well fed were without effect on the composition of the milk. The general opinion among investigators, at home and abroad, is illustrated by the following abstracts from the results of feeding experiments in many countries with many animals:

A Danish investigator, speaking of extensive feeding experiments in Denmark, says in substance: The experiments prove that the feed under practical conditions, as found in this country, exerts an entirely insignificant influence on the fat content of the milk.

Another investigator says: The complete chemical analyses of the samples of milk from the different lots failed to disclose any decided difference in the composition of the milk attributable to the different concentrated foods fed, and the

author therefore concludes that in the comparative feeding trials with milch cows now continued for seven consecutive years at this station, in which 1,639 cows have been included (separated into 161 lots on ten estates in different parts of our country), it has been found over and over again that the changes made in the food of the lots have had practically no influence on the chemical composition of the milk. In these experiments grain has been fed against roots, against oil cake, and against wheat bran or shorts; grain and oil cakes have been fed against roots, or roots have been fed as an additional food.

An investigator in Scotland, speaking of the results of his experiments, says: These experiments plainly indicate that while many foods appear to have a tendency to enrich or impoverish the milk, still neither effect is permanent, the inclination after a time being for the milk to return to its more normal composition.

The consensus of American investigators on the effect of different rations is illustrated in the discussion of the results of a feeding experiment which may be concisely stated as follows:

About five per cent. more milk was produced on two pounds and ten per cent. more on 2.5 pounds of protein daily than when the animals received 1.5 pounds each. The quality of the milk was scarcely changed.

Such was the situation in 1896, and the subject would have been considered closed, with the evidence all in and verdict rendered, had it not been that in that year a distinguished German investigator published a brief account, without giving the data, of experiments in which the percentage of butter fat was materially increased in milk by feeding tallow in the form of emulsion. In this paper Professor Soxhlet pointed out that in some of the experiments which have been regarded as conclusive on certain points and which have had much to do with shaping the general opinion of the effect of food on milk, rations were fed which were less digestible than was assumed, *i. e.*, that the particular substances tested, like fat, were added to the basal ration in such form that they were not digested by the animal. Hence, no effect could be reasonably expected. His investigations lead him to believe there is no direct transmission of fat from

the food to the milk, as some have held, but that normal milk fat is a product of the activity of the lacteal glands, and that its source is the body fat of the cow. The fat of the food affects the secretion of milk fat by replacing a part of the body fat, and thus causes a transmission of the body fat to the milk. He is confident that the fat of the food can effect a one-sided increase in the fat content of the milk; but he states that fat is the only food constituent capable of doing this.

The first brief account of Soxhlet's work is all that has been given, and whether the experiment was confined to one cow and whether the reported increase in yield of fat was continued more than for a few days is not known. As the result of the publication of this experiment a renewed interest was taken in the subject and numerous experiments have been made. While the later findings are not in accord with Soxhlet's results, they are of sufficient interest to warrant a brief review, particularly as they have led to a series of experiments on the effect of fat in food upon butter, which is discussed further on.

Tallow feeding at the New York Cornell Station resulted as follows: Five cows of different ages kept at pasture were fed a ration of equal parts of wheat bran and cotton seed meal, with the addition of cornstalks, silage, or hay when the pasture began to fail. For ten weeks they were given tallow in addition, beginning at the rate of four ounces per animal daily, and gradually increasing the amount four ounces at a time until each cow was eating two pounds daily. Similar experiments were carried out with five two-year-old heifers which had recently calved, and a winter trial was also made with five two-year-old heifers which had recently calved.

No difficulty was found in getting the animals to eat the tallow. The health of all the animals remained good, and no appreciable change in live weight took place. There was no marked change in the percentage of fat and yield of milk in the period when the cows were on a full feed of tallow. While there are slight variations in the percentage of fat, they rarely reach 0.5 per cent., and, what is of more significance, they are not uniform. Some of the cows gave richer milk and some poorer on a full feed of tallow than they did before or after.

In experiments at the New Hampshire Station, the first effect of feeding oils was to increase the fat in the milk. The sharp increase in fat was followed by a decrease until the milk again reached its normal composition. The results of this work are summarized as follows:

The first effect of an increase of fat in a cow's ration is to increase the per cent. of fat in her milk. With the continuation of such a ration, the tendency is for the milk to return to its normal condition. The increase in fat is not due to the oils but to the unnatural character of the ration. The results in this experiment tend to confirm the conclusions that the composition of a cow's milk is determined by the individuality of the cow, and that although an unusual food may disturb for a time the composition of the milk its effect is not continuous.

The results of German experiments suggested by Soxhlet's results show that the percentage of fat in the cow's milk as a rule increased during the first four to six days of oil feeding, in single cases nearly one per cent.; after ten to twenty-five days, however, the fat content again became normal, in spite of the fact that the oil emulsion feeding was continued. The yield of milk and of fat changed with the oil feeding in the same manner as the percentage of fat in the milk. Another German investigator finds as the result of experiment that the fat content of the milk was increased at first by feeding large quantities of oil in the form of an emulsion, but later on no increase took place; the milk, on the contrary, dropped to its previous normal fat content, depending on the individuality of the cow.

These experiments, on the whole, indicate that the effect of even very abnormal food materials is not to permanently alter the composition of milk, and one is forced to the conclusion that Soxhlet published prematurely the results of too short experiments. The final conclusions thus far reached indicate that the further addition of nutrients to a normal ration has little or no permanent effect upon the percentage of fat in the milk. The results of these experiments and others of similar kind are making clear the necessity of using long (four weeks or more) feeding periods and the unreliability of conclusions based upon a test of only a few days' duration.

EFFECT OF FOOD ON BUTTER AND THE COMPOSITION
OF BUTTER FAT.

The experiment reported upon by Soxhlet which led to the feeding of oils and fats stimulated a study upon the relation of the character of the fat of the food and that of the milk, and tends to throw some light upon the source of the fat of milk.

Investigations by the stations made nearly ten years ago agreed in giving conclusions, of which the following are typical:

The tendency of butter to melt during hot weather may be influenced by the kind of food and also the degree of hardness may be affected.

A mixture of cotton seed meal or linseed meal with corn meal and wheat bran, especially the cotton seed meal mixture, produced butter less easily melted and of a more solid appearance than did the peas and barley.

Gluten products containing large percentages of oil produce soft butter. Gluten meal tends to make soft butter, while cotton seed meal tends to make a hard butter. The hardness of butter seems to depend more upon the character of the food than upon its nutritive ratio.

The recent feeding oils and fats as large parts of rations has given results upon the composition of the fat of milk and butter, of which the following are fair illustrations:

Cows fed on cotton seed oil produce milk the butter fat of which gives cotton seed oil reactions. The reactions appear when the cows receive only a small quantity of oil. They increase somewhat with continuous feeding, but apparently cannot be carried beyond a certain point. The reacting substance passes into the milk within less than twenty-four hours after the feeding begins, and continues to do so for several days after it has been dropped.

The same oil had a marked influence on the appearance and taste of the milk and increased the index of refraction, diminished the volatile fatty acids, and increased the iodine number of the butter. The butter produced on cocoanut oil was normal in appearance, but had an unmistakable taste of cocoanut oil. The index of refraction of the butter was materially diminished, the volatile fatty acids were slightly in-

creased, and the iodine number was noticeably diminished. On almond oil the butter showed a positive increase in the index of refraction, and the iodine number increased. The authors conclude that the feeding of oils not only greatly changed the butter, but that the changes followed in general the characteristics of the oils themselves.

The examinations of the butter fat showed that the volatile fatty acids decreased greatly during the linseed oil feeding. This effect of the oil feeding was much more persistent than on either the yield or fat content of the milk, and on discontinuance of the oil feeding the return to a normal volatile acid content came but slowly. The iodine number rose and fell rapidly with the feeding of oil and discontinuance of it. As only small quantities of linoleic acid were found in the fat, the increased iodine number must have been due to an increase in the olein content of the fat on oil feeding. The index of refraction changed in the same manner as the iodine number, the curves for the two sets of determinations following each other closely throughout the experiments. The increase due to the oil feeding was very marked and rapid, with the maximum appearing about the fifth day of the oil feeding. The melting point of the fat increased in the same manner as the iodine number, viz.: from 35.4 to 39 degrees C.

The above results seem to warrant the general conclusions that when a large quantity of fat is supplied to the animal organism in the food it will, after having been transferred to the blood, be secreted as milk fat, but the secretion cannot be looked upon as a direct transmission of the fat from the blood to the milk glands. The fat added will be worked over in passing through the alveoli cells of the milk gland in such a manner that a large amount of olein and a small amount of a fat having a high melting point are formed. If there are large quantities of drying oils in the fat consumed, these will be changed to non-drying oils before being secreted in the milk.

SOME OF THE CONCLUSIONS REACHED.

Although the physiological side of milk production is incompletely understood, and there is need of much investigation before definite statements can be positively made, the re-

sults of a present knowledge seem to warrant the following general summary:

The secretion of milk is closely related to the nervous organism of the cow, and anything which affects the nervous system may temporarily affect both the quantity and quality of the milk. Under normal conditions, milk secretion proceeds uniformly during the twenty-four hours. Under usual conditions, the fat of the milk is partly derived from body fat but chiefly from the fat of the food. The fat is not directly transmitted from the blood but is modified and worked over by the alveoli. The quantity of milk is largely determined by the quantity and quality of the food. Under usual conditions, the quality of the milk is but little affected by the food. If for any reason the quality of the milk is temporarily changed, there is always a tendency to return to the normal.

When a cow in good condition is in full milk she will give her normal quality of milk at least for a limited time, even though the quality or quantity of her food is deficient.

When in good condition a heavy milking cow will take flesh or fat off her body in order to give her normal quality of milk.

If the food ingredients are present in sufficient quantity, in a state palatable to the animal, and easily assimilated, it does not seem to make much difference from what source they come.

The percentage of butter fat in milk is very little influenced by foods containing a large percentage of oil, such as linseed or cotton cake, nor yet by albuminous foods, such as bean or pea meal, decorticated cotton cake, etc.

The composition of the butter fat is modified within narrow limits by the fat of the food.

An increase in quantity and quality of milk over the present normal standard is to be looked for more from breeding than from feeding.

There is a tendency for the milk capacity of the cow to be transmitted to her descendants with usually only small changes in quality and quantity. By proper feeding, the heifer can be developed to her normal quality of milk. How far the quantity may be thus increased is unknown. The hope of improvement of dairy stock is in wise breeding and in careful selection and judicious feeding of the young stock.

Music by Mrs. A. Heaton Robertson.

The PRESIDENT. I would like to ask the Professor if he has found any material increase in the quality of the milk as the heifer increases in age.

Professor WOODS. Why, in individual cases, yes; but, in long continued trials, no. It has sometimes happened that there will be a considerable variation, but usually there is only a very slight variation. I think the average figures would lead us to expect changes of at least one-sixth of one per cent. It may be larger, of course, in exceptional cases. But there is a general tendency for the milk to have the same quality throughout the entire history of the animal from a heifer up. That is, the heifer that gives a certain quality will not be apt to vary much in quality.

The PRESIDENT. Do you not think notwithstanding that if there is an improvement in regard to the feed and care of the animal the heifer will develop in that respect, and that her progeny will be still better and get better and better, and so on?

Professor WOODS. Within very narrow limits, yes. But I do not believe that we can hope for a very great increase directly from the food. We have got to have breeding and feeding going hand in hand. There is a great tendency for like to produce like, and that the offspring will have the characteristics of the mother in the long run, and I think we can by careful selection very much improve our herds. But it cannot be done by feeding alone. The two should go together.

Mr. DANIELS. I would like to ask the Professor in his creamery tests, where they have made tests frequently, why it is that tests will vary? Suppose the tests are made every two weeks, why is it that the tests vary so greatly as they do sometimes in such a short time?

Professor WOODS. There are lots of things that will affect

the composition of milk temporarily for a short time. I am always suspicious when that is shown to be the case that there may not have been a thoroughly careful test made; that is, that the tests may not have been made under exactly the same conditions. That is the first thing I want to know. But, suppose if we take tests made under like conditions, there have been found even then that there were occasions when it would vary some. I think I stated a case in which a herd of Jerseys of thirteen animals, if I remember rightly, had been known to vary in three weeks as much on the average as three-fourths of one per cent., while ordinarily the herd's milk would run pretty uniformly. There are times occasionally in which it does seem to vary, and which are under like conditions of feeding and of care, and without any known reasons for it. So, therefore, we can expect short temporary variation from uncommon sources and cases. Of course there must be some cause for it, but we do not understand it, that is all. Sometimes it may be something that will affect the nervous condition of the whole herd, and at other times there seems to be something that will affect certain animals when it does not seem to affect others.

Mr. DANIELS. Perhaps I ought to explain myself a little. We are running a creamery, and during one of the winters samples of the milk from one herd of cows was taken, or one patron's milk, and it was found to vary just a whole per cent. more from the test made the next time. When it was taken the next time it went back to the usual test. We could not account for it, because we took the samples of milk apparently under exactly the same conditions so far as we knew. These tests changed from four to five per cent. It has never done it since and never did it before.

The question was brought up, how it could be so? The test was made with the Babcock machine, the same as all the other tests, but we were never able to give a satisfactory account for it. We assumed that it must have been something

in the feed or some condition that we didn't know anything about.

The PRESIDENT. I would like to know what we are going to do with some of these experiences that most every farmer has had. Now, it is a fact, in times before we got all these modern implements in making butter, some farmers kept one or two cows in a stable, and got about a certain quality of milk. About the same thing right along. I know, because I have milked those cows, and my mother made the butter from the milk of those cows, and they would give fairly good milk and make fairly good butter without any extra feed. When we first put them into a stall they would keep along in that way for some time, and then by and by we would begin to feed those cows a little good coarse meal, and you would notice right away an increase in the quality of the butter, and in the quantity of the butter. Now, if the quantity of butter was increased, how in the name of all that is wonderful did it come about if you cannot do anything by feeding cows to increase the quantity or quality?

Professor Woods. Up in Maine we have in the summer time a good many flies. We also have blueberries, and there was a man up there who came down from the country, and went into one of our railway waiting rooms to the lunch counter. He wanted something to eat, and he looked around hastily, and not finding anything that exactly suited his taste, he finally said, "I will take a piece of that blueberry pie." The waiter said, "That is not blueberry pie, it is apple." Now, I think we are quite apt when we come to talk about our cows and about the increase in their productive power to make the same mistake. Appearances are deceitful.

The PRESIDENT. That is all right, Professor, but some of you older men know that when you have seen these things right under your own eyes, you believe them after a while. I am inclined to think it is so; even to the present day there are some things that you cannot figure out that you know to be

true. If I had not seen this thing demonstrated time and again I should not be so strenuous.

Secretary GOLD. I wish that we might hear from our friend, Mr. Hadwen, on this subject.

Mr. HADWEN. Mr. President, as I understand it, the Professor says that the quality of the milk is not governed by the quality of the feed.

Professor WOODS. In the long run, yes, sir.

Mr. HADWEN. That is just exactly the way I understand it. There are some facts that scientific men have not yet been able to explain, and I think this is one of those things.

Professor WOODS. That is just the idea exactly. I am not here in the attitude of arguing the matter either one way or the other. The scientific man is simply looking for facts. I take the facts as I find them and report them to you as honestly as I know how; and as a result of all the observations that I have made I find that it comes down to this; that the quality of the milk is something which is inherent in the animal, and is affected only within very narrow limits, when affected at all, by food. I am free to admit that there are various things that will temporarily affect the quality of the milk, but I cannot imagine that there can be a very radical change in the quality in a change from one kind of food to another food. There may be a temporary change in the quality of the milk, but there is always a tendency of the animal to return to her normal standard.

Mr. HADWEN. What has the Professor to say about change from hay to grass? We have all of us who have had much experience noticed that there is a very perceptible change.

Professor WOODS. As I say, there are cases which will produce a temporary change, but there is only one instance that I have found in which it was found that there was apparently any change, or any decided change, in the quality when that was long continued.

Mr. HADWEN. It seems to me, Mr. President, that it has been clearly shown in the experience of the practical feeders that the feed does make quite a difference. They know very well that the quality of the milk is influenced to a very great degree sometimes, and not only temporarily, but in the long run, by the quality of the food which the cow consumes. That has been my experience, and I have fed cows for more than half a century. I know that good keeping will produce better milk than poor keeping. I have sold milk for a great many years at an advance because of its quality, and I have seen this shown too many times to doubt it.

Professor WOODS. Now, you are talking about butter fat? You are referring to the percentage of butter fat? How do you define quality?

Mr. HADWEN. The quality of the milk is shown by the amount of butter fat. The milk which will produce the best cream and the most of it. It is the milk which is better in itself and which the customers are willing to pay for at an advanced price.

Professor WOODS. I wish that I had here the notes that I made in preparing this lecture and the time to pick them out so that I might show you how extended a research I made in coming to this conclusion. I had a stack of notes about a foot high of exact records that have been made. I knew when I was preparing this paper just exactly what kind of a reception it would meet with in a Connecticut audience. I am very glad to have it criticised, because I am as much interested in learning the facts as any one, and our purpose in being here is to discuss them.

We commenced long ago when I was here in the Experiment Station to try some of these things, because of some suggestions from the western part of this State; we proceeded to make some experiments to see if buckwheat middlings did not make milk of a decidedly poor quality. That seemed to be the verdict in that part of the State. We made an examina-

tion to see what the fact was. When we got over into the eastern part of the State, over into Tolland County, the cows would not give any such kind of a verdict. Now, there is the trouble. It is very difficult whenever we try to bring these things down to exact records. When as the result of our investigations we find what are apparently truths that are contrary to the popular belief, it is difficult to bring them down to exact records. I know that there exist a great many notions about these matters, but there is seldom a notion that has not some truth in it, and I am well aware that it is a very difficult thing to convince a Connecticut audience from the evidence which we have been able to adduce that this is the case, for it apparently combats a very widely accepted idea.

Secretary GOLD. There is only one way by which I can reconcile these different statements. The Professor says when you feed a normal ration by adding to it you can improve the quantity and quality of the milk only for a time. But you cannot increase it beyond the normal yield permanently. Now, as dairymen, do we not generally allow our cows in that particular period that has been referred to, just between grass and hay, to live on something below the normal ration? That is, frozen grass and other materials of that kind, and when we come to give them some meal or to put them in the barn and give them good food, we know the product we get is better, better cream and better milk. Half frozen grass is not a normal ration. A cow will not eat it as well, and of course cannot be expected to do as well. She never will make first-class milk on such food. It seems to me that Dr. Atwater offered a very suggestive remark in this connection this morning. When our cows are fed upon such imperfect rations, do they not require all the nutriment there is in the food for their keep, instead of producing rich milk? The cow grows poor and gives poor milk, consuming the fat in the system, from the food. I think we are not so far apart as we might be on this question. I think if we give our cows good normal rations, and

they are healthy cows, it will be found difficult to improve the butter or the milk very much. Still, on the whole, I sympathize with Mr. Seeley, because these matters have been within my own experience.

Mr. HADWEN. I think there are two essentials in order to have good milk. One is good cows, and the other is good food. You cannot get the best milk with either alone. You cannot make the best milk from a poor cow with poor food, but you can make the best milk where you have good cows and good food together. That has been my experience for a long time. I think they go together. I think that good food has a great influence, but in order to get the best results you must have good cows with it. If that were not so, why is it that a Jersey cow will give better milk than a Durham under the same conditions? The milk will be entirely different. The milk of one is full of butter fat, and the other is without that fat. That is one of the things which has to be carefully studied. We cannot expect to get good milk except from good cows and through the use of good food. They go together.

Now, between the feeding of grass and hay I have found the best food to increase the milk, not only in quantity but in quality, is cabbage. I have been always very particular to raise a field of cabbage for my dairy. No one could buy those cabbages from me. They were raised for the cows, and by means of them I was able to keep up the supply of milk between grass and hay, both in quantity and quality. Some say, "Why, don't the cabbages affect the flavor of the milk?" They will, unless judiciously fed. But if fed in the barn and immediately after milking, you do not perceive any difference in the flavor.

It is just so as to its cooking in the house. If you chop the cabbage and put it in cold water and let it remain an hour or so and then take it out and boil it you do not perceive

any odor in the house, and you will have a better article than some of us have been accustomed to.

The PRESIDENT. While we are on this subject I want to give one bit of experience of my own. I have been for nearly thirty years furnishing milk to New York dealers and have been subject to all sorts of experiences in connection with the feeding, shipping, and treatment of milk sent into New York for the milk dealers. I only wish there was about one hundred of them present to hear this discussion, and that when it was ended we might hear from them. Now, I cannot tell you why, but I know that in the fall of the year you can take your cows off from good rank pasturage where there is plenty of grass, not frost bitten, but good pasturage. You may take your cows from those fields because you have got a little complaint from New York from your dealer that your milk is not quite as good as it should be, and you may turn your cows across the street only into a meadow that you have mowed early in the summer, and let them stay there two days and send the milk, and with no other change than that you will improve the quality of your milk. The quantity will improve, but the quality more. I know that fact, for I have tried it hundreds of times.

Ex-Governor HOARD. What do you mean by quality?

The PRESIDENT. I mean the quality as shown by a test by the lactometer and by the appearance of the milk.

Ex-Governor HOARD. You mean the flavor of it?

A. The general quality of the milk. The quality of it is shown by the cream. Its richness and how it tests. I mean a milk that has those constituents in it which will make more butter to the quart.

Ex-Governor HOARD. You know that?

A. I know that.

Ex-Governor HOARD. Our friend is very sure, but I want to say right here that in Wisconsin we have gone through experiments on this very subject that have cost us over two

thousand dollars, to see if you could feed butter fat into the milk or increase the percentage of butter fat. It cannot be done. Now understand that. We will suppose a cow is giving four per cent. butter fat in one hundred pounds of milk. Can you feed her so that she will give five per cent.? Many men think so. I have tried it in so many ways that I have given up trying, because it cannot be done. I can increase the amount per day, temporarily, of butter fat. I can increase the amount per day, but I have never been able to make any perceptible change in the relation of the solids to each other. For instance, there is three and one-half per cent. casein, four and seventy-hundredths sugar, and four per cent. of butter fat. And there it stays right along. I have never been able, in all the time that I have been at work at it, to effect any change in the relation of the solid constituents. If it were so, good friends, don't you see it would be very easy to take a Holstein and make a Jersey of it? Or very easy to take a Jersey and make a Holstein of it, that is, if you could change the per cent.? Your percentage is practically fixed. What is the reason, then, that some cows give a richer milk than others? Because they are bred so, and not because they are fed so.

The PRESIDENT. It is just here. We put a lactometer into that milk when we have any such complaint and watch it every day, and if the lactometer is any test it has shown there has been an improvement in the quality.

Ex-Governor HOARD. That is not sufficient.

The PRESIDENT. If that is the case, then will you please explain what it is that makes the difference? I have seen in two or three days, yes, I have seen inside of two days, that lactometer put into the cans of milk in my cooler and change ten points. Just because of that change from one field to another.

Ex-Governor HOARD. My dear friend, do you know that at our creamery there have been over 27,000 tests made on

milk? We made 12,000 tests at one time in all conceivable ways. Chemical analyses, tests of the Babcock apparatus, and all sorts of tests, and I want to tell you what I know. There is a temporary variation sometimes. It passes up and down like the mercury. But, notwithstanding that, I know it is not lasting, because there are certain other causes which change it the other way and change it back to about the normal standard. All sorts of conditions affect the cow's cream, feeding conditions, stabling conditions, etc.; all these things may produce a temporary variation. Some of these things may make a difference in the cows, and hence a change of feed might sometimes stimulate the secretive organs, and you do improve the flavor, and your lactometer will change up and down in the milk, but it is simply temporary. The average percentage remains about the same.

Professor PHELPS. It seems to me, Mr. President, that there may be a possibility of harmonizing these differences. I do not know that I am capable of doing it, but there are a few experiences that I have had that seem to bear on this point very strongly; that is especially the case, because they were experiments which indicated very clearly the way we may misinterpret results. A few years ago while Professor Woods was still active in the work in Connecticut, we planned some experiments together. I had charge of them mainly. They were to test the effects and the relative value of different green fodders with respect to milk production, and in this connection quite a series of tests were made. We had certain feeding periods in which we used different kinds of green fodders. We had a period in which we used Hungarian grass, and this was followed by a period with clover and that by another period with Hungarian grass, and then by another period with clover. There were four cows in the test. During the clover period following one with Hungarian the per cent. of fat averaged about one-half per cent. higher for the clover test at first, but as we followed up with the feeding of clover

for about fifteen days the fat dropped to nearly the percentage which existed in the milk before clover was fed. Not quite back to that condition, however. The cows were then fed for another period with Hungarian grass and the per cent. of fat dropped to practically the same point it stood at when we were feeding Hungarian the period before we fed clover at all. That went on for a time and then we fed clover again. The gain was nearly one-half of one per cent. on an average, but after four or five days the milk commenced to show a smaller per cent. of fat. In other words, the tendency seemed to be for the milk to return again to nearly its normal per cent. of fat after continuing the clover feed for a couple of weeks.

Very likely some of you have got those conditions that Professor Woods refers to, where the amount of feed is not sufficient to supply the demands upon the system of the animal. Under such conditions the per cent. of fat may fall below the normal. The statement that the feeding will change the quality of milk is a sort of a half truth. It is not the whole truth. It is the province of the scientific man to get at the whole facts, the whole underlying truth, and to interpret these truths in the light of the best evidence that can be brought to bear. I still think that the position taken by scientific men, so far as the evidence is concerned, is correct.

EX-GOVERNOR HOARD. That is it, you see. You can stimulate for just a little period, but the cows go back to the normal after a short time. They go back to their normal percentage. Of course, as has been said, there are these variations, sometimes daily and periodically, that we do not know anything about. They are probably due to different causes. We do not know how to explain them. There are unquestionable changes up and down in the composition of the milk, but when we take the product of the cow through a long period of time the fat and composition are essentially the same.

A MEMBER. Do I understand you to say, Professor Phelps, there is any difference between Hungarian grass and clover?

Professor PHELPS. We got better returns from clover because we got decidedly more milk and thus more butter fat. We got relatively more butter fat also, but it was only for a short period; in the end the composition dropped back to about the normal condition.

The PRESIDENT. I know that all people do not agree with me about this. I cannot tell you how it is done in the cow. I think that Dr. Atwater indicated that here this morning. He indicated what to me is pretty true, that if you feed straw all the energy from that is expended in digestion and sustaining life, and there is very little nutriment left to go into product. I think there is a good deal more to the theory which Professor Atwater advanced than we have believed.

Secretary GOLD. Mr. Seeley voices the opinion of our milk producers generally. They get those notices from New York when they are feeding poorly, and they change their feed for the better and complaint ceases. But it seems to me that we can take up some other matter to our profit as we are thrashing over a good deal of old straw.

I propose now to call upon our friends connected with the experiment station and with the State Agricultural College to speak of their work and of the exhibition which they have made. Director Jenkins is here, and I will now ask him to tell us something of the work of the Connecticut Experiment Station, which has an exhibit in the rear of the hall, and then I propose to call on some of his co-laborers in that work, especially as to the results of the investigations which they have made of food products, and so on as appears in the exhibit on the tables.

Dr. JENKINS. Mr. President: I should be sorry to interrupt this talk with regard to the effect of feeding upon the amount of butter fat. It is always interesting, and I was just about to get up, not to discuss the matter on its merits at all, but simply to make this remark which I think is ab-

solutely true: that no one can rationally discuss the result of feeding or the effect of feeding upon butter fat in the milk unless he has weighed the milk from every milking, and unless he has determined the fat either by the Babcock test or by some other laboratory method. An examination of milk which has been shipped from Litchfield down to New York is not likely to show exactly what the cows give in that locality. I have seen train hands drinking out of the cans, from the cover of the cans, and then filling up the cans in such a way as to make the quantity appear correct, with water, and by just so much water as they poured in the milk was deficient. The lactometer, as the sole test used by the wholesale dealers in New York, shows absolutely nothing as to the contents of the milk. The less fat you have the higher specific gravity you get. This is a subject which cannot be discussed in a rational way unless the quantity of milk at each milking is known, and the percentage of fat in that milk shown by the Babcock test or by some other laboratory test. Now I think that wipes out considerable of this so-called practical knowledge with regard to the effect of feeding on the amount of fat in the milk. If you do not know how much milk a cow gives at every milking; if you do not know the percentage of butter fat in every milking that she gives, it is impossible to make any rational conclusion. There is no use in discussing it at all.

If any of you have a chance to look over the tables at the rear of the hall containing the samples which have been brought down from the station, you get a fair idea of the range of the station work. They do not show the entire work of the station. We are doing a lot more work than that, so that this exhibit does not furnish at all a complete table of the contents of the work which has been done at the Experiment Station this year. Necessarily from the time the station was established we have had to do a large amount of work in detecting frauds which were being practiced upon the farmers, and helping to stamp out these frauds as far as pos-

sible. We have also had to strengthen the good intentions of those who have various waste products of manufactories to sell which are a little too good to burn for fuel, and a little too poor to be sold under the manufacturer's own name, or for what the product actually is. It has been said that there is a great wave of commercial dishonesty going over this country at the present time, but I am inclined rather to look at it as a sort of general submergence in original sin which has been with us since the foundation of the world. The first fraud, in fact, was practiced in the Garden of Eden when misrepresentation was made regarding the character of the food offered to our first parents, and that kind of fraud has been practiced ever since. I think, however, that there are some signs of hope at the present time. Here and there the dry land of business integrity and honesty is beginning to appear above the surface of this flood, and it is our mission to help on the coming of the time when people shall see that honesty is the best business policy, as asserted by that immoral old moralist, Ben Franklin.

Now, I only propose to speak of one single feature of this exhibit. We are often asked what is the use of going on year after year with the analysis of commercial fertilizers; of repeatedly examining the well-known standard brands which do not change their composition from year to year? It does look sometimes like a waste of time; but in the exhibit are several samples which show what may be the result of an annual inspection of things which are regarded as "standard." Now, one of the things which has always been regarded as the same and subject to no considerable variation in its percentage composition is the commercial potash salt. It is sent out in sealed bags, and it has pretty uniformly held up to the standard since it has been put out by a single syndicate. There has been no inducement to adulterate, and it has been supposed that it was always the same. We find, however, some samples of high grade sulphate of potash which are not at all

what they have been in past years. There is one shown in the case which has, to be sure, forty-eight per cent. of potash, but nearly twelve per cent. of this potash is in form of muriate. A careful tobacco grower, who is avoiding all chlorides in his tobacco fertilizers, would immediately reject such a sulphate as this as dangerous to use. Certainly it was worth his while to have sent us a sample for analysis so as to know what he was getting. There is another sample there, sold for high grade sulphate, which looks like a sulphate, but which was found to contain only about thirty-one per cent. potash instead of forty-eight per cent., and it contained besides a mixture of phosphates and nitrates. It was not at all what it was labeled. It represented a lot of 1,200 pounds for use on tobacco. The sample was sent to us for examination, and the purchaser having found that out, he was able to make the seller give him a rebate. In other cases muriate of potash was found having much less potash than there should be in a good article. I think these illustrations justify the policy of the station in making an annual examination of these fertilizers which have been regarded as "standard."

Take the matter of feeding stuffs. Cotton seed meal is a "standard" article. We find some samples that are adulterated with rice hulls, and some with cotton seed hulls. One car load came into New Milford, and was found upon analysis to contain 3.75 per cent. of nitrogen, only about half what it should have contained. This was shipped back out of the State. It certainly was worth the purchaser's trouble to have an analysis made, because it protected him against fraud. Cotton hulls are used as the adulterant, and are ground so finely that when they are mixed with the clear meal, the mixture looks almost like the standard product.

I do not propose to say anything in regard to human foods, for Mr. Winton is here, and he will say something on that subject. I think these things illustrate the point that eternal

vigilance is the price of good fertilizers and feeds, and that it pays to have even "standard" chemicals and feeds examined.

Secretary GOLD. We will now hear from Professor Winton.

Professor WINTON. Mr. Chairman: It is my purpose to speak to you on our work in detecting food adulteration. During the past year we have continued to buy groceries over the State, and examine them with reference to what they contain.

In the case which we have on exhibition you will find some sixty samples of food products which have been obtained in different sections of this State and which have been examined at the station, and in every case found to be adulterated. Those samples do not represent the total number of adulterated foods, but the number of *kinds* of adulteration. The actual number of adulterated samples would run into the thousands. I will call your attention to some of the forms of adulteration recently disclosed. The subject of milk has been up for discussion, and perhaps it might be well at this time to call your attention to two chemicals which have been found in milk sold in the State. Undoubtedly much of the milk that has found its way into the nursing bottles of this State has contained one or the other of these two chemicals: borax and formaldehyde. We know that these chemicals have medicinal properties, and even in small quantities may be highly injurious to health. Perhaps a little story told by a New York chemist may illustrate the nature of formaldehyde. One of his friends came to him with a dog which, like many well-bred dogs, was troubled with fleas. The chemist prescribed formaldehyde as a lotion which would exterminate these little creatures, adding that it was perfectly harmless, being used extensively in milk. They made up a very weak solution of this "harmless chemical" and gave the dog a bath in it, but shortly afterwards the dog died. This thing which kills dogs

by external application is a dangerous thing to give babies internally.

We have here three samples of buckwheat flour. One of them is nothing but wheat middlings, another is a mixture containing corn flour, and another still contains both wheat middlings and corn flour. I know that opinions differ as to the best ingredients for buckwheat cakes, and I do not wish to dictate what the people of Connecticut shall eat, but when you buy buckwheat flour you want buckwheat flour, and when you buy wheat middlings you expect to pay the price of wheat middlings. About two-thirds of the samples bought under the name of buckwheat flour proved to be these cheaper articles.

We have also in the past year been through the different brands of baking powder sold in the State. Our agent found seventy-six different brands on sale in Connecticut, and I am certain if he had looked still further he would have found more brands. These baking powders have been analyzed and sorted out according to their constituents. All baking powders contain bicarbonate of soda, but they differ greatly as to the acid material used to liberate the gas. This acid material may be cream tartar, tartaric acid, a purified phosphate, or alum.

Mr. SEELEY. Professor, will you name some of those baking powders which you consider absolutely pure and safe to use?

Professor WINTON. I hope you will excuse me from that.

All of these active acids serve one purpose, and that is to liberate the gas which puffs up the bread. The objection to all classes of baking powder is that they leave a residue in the bread. The residue of a cream tartar powder is Rochelle salts, of a tartaric acid powder is tartrate of soda, of a phosphate powders, a mixture of phosphate of soda, and phosphate of lime, and of an alum powder, Glauber salts, mixed with an aluminum compound. Of these chemicals left in the bread

product, the aluminum compounds are the most objectionable. Numerous experiments made by disinterested investigators lead to the conclusion that an alum powder is injurious to health, although it should be stated that other experiments carried on by friends of the alum people make it out perfectly harmless. Over two-thirds of the samples examined contained the alum. If they would stop with the use of alum we might feel reasonably secure, but they do not. I have here a box of what is called "Sweetheart Baking Powder." It is very prettily gotten up. This powder not only contains the highest percentage of alum which we find in any powder in market, but in addition contains one-quarter of its weight of a ground rock (chiefly soapstone). I will say that this is probably the most heathenish baking powder that has ever been brought out in the United States.

A MEMBER. I want to inquire why you would not answer that question which the President asked for the names of pure baking powder.

Professor WINTON. I will say that we do not know in the first place what is pure baking powder. Any one has got the right to put up a preparation and call it a baking powder, as the law does not define the term. We can tell you just what these powders contain, and the public must decide which they will use.

Q. Well, if you were going to buy some for your own family, what brand would you buy?

Professor WINTON. I do not myself do the marketing, and, furthermore, if I did, it would not be proper for me to advertise any particular brand. If you will ask me as to the composition of any particular brand I will tell you so far as I am able to, but it would not be proper for me to name any list of brands of baking powder or to advertise any particular brand.

Mr. PALMER. I should like to know whether this servant of the State is paid for keeping still on this question. It seems

to me that this is the very thing that the station is established for, and he ought to be willing to give us this information, if he has it.

Prof. WINTON. Well, in answer to the gentleman's question, I will say I am paid for doing my duty. I will give you any information on the matter that I can, other than singling out any particular brand. Plaster is often added to baking powder, or is contained in the materials used as an impurity.

In this package we have what is known as Zanzibar carbon. It is used on meats to give a "richer color than smoke produces," also for coloring bologna, frankfurts, etc. The name would indicate that it was a product of Zanzibar, but, as a matter of fact, it is a mixture of salt and a coal tar dye.

In the case you will notice some brilliantly colored cloths six inches square that were dyed with coal tar color obtained in each case from a single glass of soda water bought in the State. The original cloth was a white fabric known as nun's veiling. Now, as to the healthfulness of these products, I do not know, but I do know, however, that these dyes are a fraud because they are used to make an imitation of pure fruit products. Instead of using a pure fruit juice some dealers substitute a mixture of artificial flavoring extract, coal tar dye and sugar with salicylic acid as a preservative. In many syrups there is no genuine fruit juice whatever.

This is only a small part of our work, but I have called attention to some of the more interesting things.

Dr. JENKINS. We are endeavoring to secure an enforcement of the pure food law so far as we can enforce it. I believe the Dairy Commissioner is now after those who have been offering for sale the "Sweetheart Baking Powder," and I think he will have it out of the State very soon.

Convention adjourned to 8 P. M.

EVENING SESSION.

December 12, 1900.

Convention called to order at 7.55, Vice-President Seeley in the chair.

The PRESIDENT. The first thing upon our program will be music by the Young Men's Christian Association orchestra.

Music by the Orchestra.

Mr. J. H. HALE. Mr. Chairman: After listening to this excellent musical program I want to make a suggestion. As our friends, the musicians, are packing up to go it seems to me very often we let our friends pass by without the little pat on the back or kindly words of appreciation that if spoken in time would have left good feeling. I know it is the custom of this Board of Agriculture at its closing session to pass a resolution to all of our friends who have contributed to the success of our meetings in various ways, but our good brothers will not be here then, so I move a special vote of thanks for the gentlemen who have so pleasantly entertained us for the past half hour.

Mr. HINMAN. I want to second that motion, and I trust that it will be passed by a unanimous vote. I think these gentlemen are entitled to something more than a vote of thanks, however. I move to amend. I move that Secretary Gold be instructed to select a barrel of the nicest red apples he has on Cream Hill and send it down to the Y. M. C. A. rooms.

Mr. HALE. I will accept that amendment gladly.

Motion passed.

Leader of the ORCHESTRA. In behalf of the members of the Y. M. C. A. orchestra I beg to thank you for the cordial way in which you have received us. I was asked to come here and give the services of the orchestra by Mrs. Pickett, and was glad to do so. I am sure the little effort we have put

forth has been amply repaid by the kindly way in which we have been received this evening, and as representing the orchestra I beg to thank you, Mr. Chairman, and the members of the Board, for this very kindly vote.

The PRESIDENT. Our next number on the program is "Lessons in Pomology for 1899 and 1900," by J. H. Hale. Two years ago, I think, I introduced this same gentleman as a young, hardy, "hale" man. To-night I am warranted in introducing him as grandfather Hale.

Mr. HALE. Mr. Chairman, ladies and gentlemen: After that introduction I feel very kindly towards the chairman of a Massachusetts institution who, last winter, introduced me as the "notorious Mr. Hale."

LESSONS IN POMOLOGY FROM 1899 AND 1900.

By MR. J. H. HALE.

I am not going to read you a whole sermon, but I have a few notes here which I thought would guide me a little better along the route which the worthy Secretary has laid out for me. The subject which Mr. Gold wanted me to treat upon for an evening's talk I may have to broaden out a little in order to cover the ground which I would like to. The subject of the evening is lessons in pomology for the last two years.

The lessons in pomology for the last two years have been unusually marked and broad in their significance, but it seems to me that in this closing year of the century it is a good time to talk about American fruit production as a whole. I think it was at the meeting two years ago I said something about the early history of fruit growing in America, and that the early planting of trees and vines was with the one and only object in view of producing something to drink. It is only within this century that our attention has been turned to the production of fruit as food, and only in the latter years of the century that it has become a very prominent factor in our agriculture. We have been talking these two days about the various products of the farm; we have hardly stopped to think that of all the products of the farm none of them come from the farm itself ready for use as a wholesome

nutritious food for man as is the case with fruit. The other products have to go through more or less manipulation; through more or less preparation by cooking, etc., before they are available as wholesome, palatable food, but our fruits are pure and wholesome and nutritious and unadulterated, and come directly from the farm ready for use. We do not have to have any special laws to protect us against eating adulterated fruit.

The importance of our fruit industry has been well illustrated by an article in the November number of *Harper's Magazine*. The gentleman who wrote it, however, while he can write a very pleasant magazine article, was evidently not well versed in pomology or horticultural interests of our country and evidently took his information second hand, and some of it must have been third hand, because he doubles up his figures in various ways that are surprising. Yet, there were a good many valuable statistics testifying to the fact of the great increase in our fruit industry, and it certainly is a notable fact that a great magazine like *Harper's* would devote a special article to the fruit industry of this country, and show something of its magnitude.

It was only in the early years of this century, in 1814, when they wanted to celebrate the close of the war of 1812 in New York, and they wanted to make a great plum pudding, that but 60 pounds of raisins could be found in the city of New York. Last year, one State, California, produced 70,000,000 pounds. That shows something of the increased production of fruit in this country. There was not a raisin grown in this country when California was discovered. Not a raisin produced here twenty years ago, and yet 70,000,000 pounds have been raised in that one State in this last year. This article estimated that there were nearly seventy million dollars' worth of strawberries produced and consumed in America. Beginning next month the early berries will commence to come from southern Florida, and there will be one continuous supply flowing into the northern market clear into August, when we will get them from the far North. Six months of continuous supply of strawberries in this country, and they are consumed to the value of seventy million dollars' worth annually. I think I shall have to criticise the gentleman's figures a little as being a little wild. For he says that the State of Delaware

will put this year about four million baskets of peaches on the market, and he estimates the same for Connecticut. Now he must have estimated last May before the freeze came, because we did not have that number. It will be probable, however, should the fruit crop blooms all live in Connecticut, on the trees, that are now growing in our State, it will be possible for the State of Connecticut in the first year of the next century to produce between three and four million baskets of peaches. We ought to do as well as that. Other States have passed this mark. The total value of the peach production in America at present is about fifty million dollars a year. Think of it! That valuation on peaches alone. Some of the estimates which this gentleman makes in his article are high. For instance he estimates for one hundred million dollars' worth of grapes. I think that is a very great over-estimation, and cannot be correct. Probably there are from twenty to thirty million dollars' worth of grapes actually produced in this country. Eight million boxes of oranges are produced in California. I do not know but I am something like the fellow who says, "I told you so," for ten years ago, in making a census of the fruit industry in America and counting the trees then in hand that were being set out from nurseries and in process of being planted, I made an estimate that in 1900 there would be ten million boxes. There has been an enormous development in this industry, and the rapid increase of the crop in that one State has been something wonderful. In New York I saw, side by side, in one store, boxes of oranges of the old crop, and boxes of the new, so that there was a continuous supply all the year around of that delicious fruit, and it has all been the development of the last twenty-five years.

There are nearly thirty million dollars' worth of small fruits produced in this country, such as raspberries, blackberries, currants, and gooseberries, and we have a constant supply for four or five months.

This article was still wilder in its estimates of the apple crop, for it estimated it at 210 million barrels as the crop of America's greatest apple year. Now the greatest crop was in 1896, when we had only about seventy million barrels of apples. There has been a wonderful development in the demand for this luscious fruit. The market is constantly widening and the demand is ever increasing. New York city alone,

that little village down below New Haven, why they consume annually a total of sixty million dollars' worth of fruit in that one market alone, and the estimate of the whole country at this closing year of the century is that a billion dollars' worth of fruit is grown and consumed in America annually. This is entirely a development of this present century, and ninety per cent. of it of the last thirty years of the century. I wish that we could get accurate figures about all these things. Let me tell you something about the present census. I do not like to criticise, yet it is well to go on record at the right time. The gentleman who had charge of the present census, that is as to getting for New England the horticultural statistics, standing under one of the grandest oaks that I know, looked up and asked what kind of a tree that was. He was a preacher from the northwest taking the census of horticulture in New England. He was evidently a man that was not conversant with the history of horticulture, for in conversation about a number of horticulturists he did not recognize the names of Downing and Barry and men of national fame in that connection, or even the names of Gold and Augur in Connecticut; he had never heard of them. He did not know who Bailey was, and yet he was to give us our statistics on horticulture. I wonder what they will be.

Now of the lessons of the last two years. What are they in American fruit production? It is a remarkable story in many ways. In the first place, early in February, 1899, the greatest cold wave that has ever swept over this country since we have had any record of temperatures, spread over almost all the United States from the north to our furthestmost border on the Gulf of Mexico, and from the Rocky Mountains to the Atlantic Coast. The temperature went far lower than in any records we had before. In the far South they had been having warm open weather, with the temperature ranging from fifty up to eighty degrees, and in the more northern states for two or three weeks prior to the freeze there had been comparatively open weather, and then in the South it dropped to zero, and in some places to four or five below, and in the South it went down so low for that section that it destroyed all the fruit prospects of 1899, and thousands upon thousands of fruit trees, even killing oak trees. Many of the stout oaks of the southern states were killed by that great freeze. Trees two and three feet

in diameter succumbed. Through the middle north it killed the fruit buds only, and still further north it killed the fruit buds, and burst the trunks of trees. It burst thousands and thousands of apple trees, and thousands of peach and plum trees. In some places, very soon after the freeze, many of the orchardists sacrificed their trees entirely, cutting them down, thinking they never could be made of any value, but when spring opened up and mother nature began her kindly work, by judicious pruning and thorough cultivation the trees that had seemed almost as bad as those that were entirely destroyed were gradually brought back into new life, and by thorough cultivation and vigorous pruning and care, after a time began to appear as though there was nothing the matter. It was the greatest blow the fruit industry ever had. Of course the natural result from such an event was that there was a short fruit crop in most sections of the United States in 1899, but there was one lesson which it taught our growers. It stimulated greater care and closer attention. Trees that had been looked after only casually have been looked after, both North and South, as they never were before, and in that respect that great cold wave was a benefit to many orchardists. In the far South and in the northwest hundreds of thousands of orchard trees were killed entirely, and hundreds of thousands were badly weakened. In some of these injured orchards, where the tops were closely pruned back and the best of culture given, eighty per cent. of the trees recovered, and put on new heads in the season of 1899, and are now about as good as ever; but, where they were not so cut back, from fifty to eighty per cent. died out, or are now so weak as to be of but little value. In my own orchard in Georgia, 100,000 trees had their tops entirely cut away right after the freeze, and ninety per cent. of them had perfect new heads, and a full crop of fruit in 1900. One lesson we learned from that great freeze, besides the lesson of greater care, was in our northern orchards particularly that if we had planted a mat of clover upon them or had provided a good cover crop it would have been a great benefit. Orchards that had been cultivated and then sown to clover had a heavy mat of clover, and the orchards that had this clover crop on were the ones that suffered the least. The ones that had bare ground

with no cover crop on of any kind were the ones that suffered the most, other conditions being equal.

To meet the loss of the fruit crop in 1899, a comparatively new industry, or a new line of production sprang up. For years we have been growing cantaloupes, and they have been sold in a moderate way in the markets. In 1896 there were a few cantaloupes planted in southern Colorado, and a very few car loads found their way to a few of the western markets, and comparatively none of them came east of the Mississippi, but on account of the shortage the crop was eagerly bought up, and the success of the growers stimulated a more general planting in 1897, so that in that year there was something like a hundred car loads came out of that territory. They were eagerly bought up, and brought good prices and were appreciated to such an extent that it stimulated further planting, so that in 1898 there was some four or five hundred car loads shipped out of that territory. They went to most of the northern markets of this country. All of our Atlantic Coast cities were supplied for a considerable part of the season after the great freeze had destroyed most all chance for a fruit crop in 1899. Live orchardists North and South saw this new opportunity in the culture of cantaloupes, and they went to planting in some cases almost a thousand acres, so that in the following year, in all of our Atlantic Coast states, from Florida to New Hampshire, there was a tremendous increase in the planting, and the result was that, in 1899, there were nearly four thousand car loads of this pleasant fruit produced in the United States and consumed by the people, and a majority of it paid a fair profit, some of the growers realizing a very handsome profit on account of the superiority of their shipments. There was a new industry built up almost at once from the demand upon the fruit growers of something to take the place of the shortage that was created by the great freeze. That was the greatest blessing of the freeze, the building up of that industry, and stimulating the people to eat the delicious cantaloupes for four or five months in the year, instead of four or five weeks as had been the case previously. It is a wonderful new industry, and one that has come to stay.

Some of our hardy fruits that have been encouraged and planted for a number of years have fallen somewhat into neglect because of the larger and finer fruits coming along every

year and meeting and supplying the demand. I know of one instance, or, in fact, I know of several instances, where a particular peach which was of an extremely hardy variety, of very high quality, but of ordinary size and somewhat inclined to be small, in answer to some cultivation it would grow to good size, but its uniform appearance not coming up to the standard had caused it to be neglected, and orchardists were cutting it down right and left. But in this instance I speak of, where there was this shortage in crop, this variety of peach produced a crop in 1899 where thousands of other trees failed entirely. This particular variety in the central West gave them good crops of fair fruit and realized to the growers enormous prices, and as the result it will stimulate the owners of those trees to give them steady and uniform care with other trees, because in occasional years they will reap a harvest on account of this tendency, and because of their extreme hardiness to bear when there is a scarcity owing to climatic conditions among the other varieties.

Now, there are some other very interesting things in this connection which I may tell you. This last fall it was my privilege to go down into the mountains of western Maryland and Virginia as the guest of the Industrial Department of the Baltimore and Ohio Railroad. This Industrial Department of the road aims to develop new business, and to stimulate the better management of old lines of work along the line of the road. They aim to get more business in that way. I was asking of the industrial agent of the Baltimore and Ohio road what was the general policy of his road, and on what principle he was working, along what lines? He told me this: He said, when I came into this position two years ago, my instructions from the president were these: "Turn yourself loose anywhere and everywhere along the line of the Baltimore and Ohio, and see what you can do to develop the territory along the route. What we want is that the Baltimore and Ohio shall have every mile of the territory contiguous to the road productive. We do not want to build up great cities, but look out for the little things along the line of the road, and see that every mile of the road shall produce some business."

It seems to me that there is a point for us in our horticulture and in our agriculture. It seems to me that if we see that every mile of the farm, or every acre of the farm, of

our farms here in New England, and that every section of the farm is developed and made productive, it would have a tremendous effect upon our New England horticulture and agriculture.

But let me tell you one interesting thing that happened upon that trip. Up in those mountains I found upon that rocky, hilly land, somewhat more elevated than we have in Connecticut, but very much of the same general character as the high land in northern New Haven County, and much of that in Litchfield and Fairfield and in other counties of our State, almost what we have been calling abandoned land; brush pasture or mountainous land where the timber has been cut away and the brush has grown up, we found young men there, brothers, who were born down there on a farm, both with the love of good fruit and the love of nature in their hearts, and they had taken a thousand acres of that rough, hilly land — such land as the majority of you if you had owned it, would have gone before the tax assessor and sworn it was not worth five cents an acre, and that you don't want to pay taxes on it. We found that those men had taken a thousand acres of that land and had pulled out the stumps and rolled away the stones, and had planted it in peach, apple, and plum orchards. Think of it, a thousand acres of that rough, rocky land, as rough as you can find almost anywhere in the State of Connecticut, cleared up and put into commercial orchards within the last two years. It is a wonderful object lesson. They have set out a commercial test orchard of 700 varieties of fruit, including peaches, apples, and plums. They are growing fruits there because they love fruits, and are growing them for profit. It is a wonderful object lesson for the horticulturists of our eastern states that such a thing should be going on right below us there in that rough mountain land, on such land as we have been prone to consider practically worthless. It is land in a country that is favorably situated to reach the great markets of the world, but nowhere near as favorably situated as most back country towns in Connecticut as to accessibility to good markets. It is an object lesson that would pay the members of this board to go and look over and then come back and report to the farmers of the State of Connecticut what can be done under such apparently adverse conditions as those young men are doing in the

mountains of western Maryland. I am sure it would encourage Connecticut farmers to know what those men are doing there.

The general failure of the 1899 fruit crop, as I said earlier, stimulated wonderfully better tillage and better care all over the country. The trees were more carefully attended to, and, in consequence, developed a greater amount of vigor than without such care. Of course a part of this resulted from the favorable climatic conditions last winter. But there was the most wonderful fruit bloom in 1900 America has ever seen. From the South to the far North, and from the East to the far West, every tree that had size enough to produce fruit buds did produce them, and came into bloom. It was the most marvelous fruit bloom that this country has ever seen or perhaps ever will see in another century. But it was like a great many of the promises of this life, it was glorious in its promise, but the fulfillment was not so glorious. The trees of the South and the southwest, and on the Pacific Coast went through the blooming period all right, and set a most perfect formation of young fruit. In the northern states, there came a frost for two or three mornings in May which killed the buds entirely in many localities; killed all there was on many trees on lower levels; that is, on land situated low down. In other localities it killed everything except on those trees that were on the highest hilltops, so that probably not more than twenty per cent. of the promise of fruit which was apparent in April was realized. North of Mason and Dixon's line by the first of June those early promises were entirely dispelled. The tremendous set of fruit in the far South gave a wonderful promise early this year of a wonderfully large crop, but as the harvest began or just after it began in the far South, and as it began in the central and middle South there came on a rain, and for eight weeks in the lower Mississippi valley, and for six weeks in Georgia, South Carolina, and Virginia, and about four weeks in North Carolina, and eastern Virginia and Tennessee there were practically continuous rains during the harvest season which destroyed all the way from twenty-five to ninety per cent. of the crop in different orchards by the brown rot setting in. I speak now specially of peaches and plums, although some apples and grapes suffered in the same way. In the western part of Michigan part of the crop was de-

stroyed in the same way. But dry weather came on later so that they secured some superb fruit.

Here in the northeast where we are immediately interested and excessive drouth prevailed, we had a great object lesson showing the results of care under conditions of extreme drouth, and those lessons are of very great value to us. The peach crop on the whole in the United States for 1900 was, in twelve different states of the Union, more than double the ten years' average for all the loss in the South and in the North and in the West. Twelve of the states gave double the ten years' average, and there were three other states that gave more than the ten years' average. The particular lesson that we had here in Connecticut under conditions of extreme drouth was the lesson of culture. We have been talking in this Board for years and years and in our State Pomological Society since its organization a great deal about such culture, and the results of culture in fruit planting as to tree food and retaining moisture, etc. And as the result of that we have been steadily increasing in our State in our soil culture, and many of the orchards are now most thoroughly cultivated from early in the spring till the end of the harvest. Nearly all over our State where culture was given there were many magnificent crops, and wherever the buds had not been killed by the frost in May. Some of the largest and fairest and most beautiful peaches and pears and apples have been grown, probably the finest peaches that were ever grown in Connecticut were produced this year in those orchards where careful attention had been given to culture. It was entirely the result of culture. It seems to me that brings us an instructive lesson. On the other hand in some other sections and in the same sections where less culture was given there was only a moderate degree of size and quality in fruit that was grown. Where there was less culture in some places the drouth actually destroyed the crop. In some places apples and pears and peaches in the State of Connecticut were an absolute failure on that account. The fruit dried up and puckered up on the trees because of excessive drouth and heat in such fields, and yet in adjoining fields similar varieties of fruit were successfully brought through in good shape where the land was most thoroughly tilled, and some of the finest productions I have

ever seen in the fruit line were the result. It is a wonderful lesson of what culture will do.

We have learned another lesson too. Some have been planting trees close together. Others have been planting wide apart, or they have died out so that they are now wide apart. That has taught us a useful lesson in this respect. It does not do to have the trees too close together, for in dry weather they act as so many pumps on the ground, drawing the moisture from the soil. Where the trees are wide apart under similar conditions of culture to those closely planted the result was some handsome specimens of fruit. That is a lesson of great value. We have learned, and we have seen it more and more in the last two years in our State, that we are to do away with plowing on our rough, rocky land, that must be broken up once a year to make it light, and do more harrowing. All over the State I have been finding our orchardists are abandoning the plow and are working with the harrow, which is along more modern lines, and are getting better results because they are keeping the soil mellow and broken up at less expense, and are getting apparently more vigorous trees. This extensive culture that we have been giving is teaching us another lesson. I see some of my fertilizer friends here, and I want to say to them that the good culture that has been stimulated by this board and by the Pomological Society is teaching the people that they can get along without fertilizers. They do not need to buy as bountifully as they have in the past if they will only till their orchards as they should. There has been a great advance in that direction. Do not worry about tilling too much. Very few of our orchardists will ever till enough, but those that do till are using less and less fertilizer, and are getting better results than they would with less tilling and more fertilizer. There are one or two orchards that are being developed on rather light land without the aid of any fertilizer whatever, by simply stirring the soil from early spring until early fall.

Mr. Merriman of our Pomological Society is here. I wish that he might give us his experience in this line. We have been talking for a number of years about the people who work every day, or as they say in the South, "like a white man." Some people have got the notion that apple trees have off years. We have been contending in our Pomological Society

that there is no need of off years, and that if the apple tree is cultivated and fed and pruned and cared for as it ought to be and never allowed to overbear, that there should be a growth every year of good fruit. Mr. Merriman is one of our old-time orchardists, and has successfully and continually shaken his head at that idea. Well, when a man is converted, we are glad to have him with us, and give his experience. I have a letter from him which I wish I might read in relation to his culture of his orchard the last few years. That orchard has had better culture than it ever had before. It has always had good care and has been one of the model orchards of the State, and, as the result, our friend Mr. Merriman has been brought around to the continuous crop idea. He has found that out for himself. He has got his apple trees so that they will work all the time, every year. They do not loaf one year and work the next. I think it was 1,500 barrels last year and 1,000 this that fell off these trees, and then left him with a good big crop besides. That was a wonderful lesson in continuous bearing whereby right culture and right feeding and tillage has given such a wonderful result. That lesson alone is worth thousands to me, and it is worth a million to the fruit raisers of the State of Connecticut, if they will only listen to it.

Apple crop statistics sometimes published by people interested in handling our farm products, injure the producer. We have got such a large industry in apples in this country that we have people who have organized themselves into what is known as the Apple Shippers' Association, made up almost entirely of middle men, or those who are buyers, and once a year they come together and compare notes and plan about the crop and what it's going to be, and what they can afford to pay for it. When they came together this year in convention they estimated the crop of America at something like one hundred million barrels, and they planned that they would pay the growers at about sixty or seventy-five cents a barrel. A great many of the apples of America were sold in September at from sixty-five to eighty-five cents per barrel in the orchards. In most instances the buyers furnished the barrels, but in some instances at eighty-five cents per barrel, the barrel was furnished by the grower.

Some of our apple producers haven't the facilities that they need, and in consequence were obliged to sell, and did sell at that figure. If they had been able to hang on to their crop they would have done much better. The apple market to-day is good for \$1.75 to \$3.50 per barrel, for those same apples, which is a large profit to the men who had the ability and the foresight to handle them and store them and keep them in good condition for a rise in the market. They have realized handsomely on this investment. While I am speaking in regard to this Apple Shippers' Association I have a little clipping which may interest you in regard to the proceedings of this meeting, and it is particularly interesting to me because it is coming around to this point that is to provide some standard for apples. A resolution which they passed at their last meeting was like this. They resolved that the standard for the size of No. 1 apples should not be less than two and one-half inches in diameter, and should include such varieties as the Ben Davis, the Baldwin, greenings, and other varieties of kindred size, and that the standard for russets and pippins and other varieties of kindred sizes should not be less than two and one-fourth inches in diameter for No. 1 apples, and further that No. 1 apples shall be at the time of picking practically free from the action of worms. I for one am very glad to see the day go by when anything and everything coming from the apple tree can be sent to market. Why, all of you can remember when we used to almost get into a fight if any such fruit was rejected. Now, however, the apple buyers insist that No. 1 apples shall be sound and free from wormholes. I am glad of it. That is a big step forward. They require that they shall be hand picked from the trees, and of bright normal color. The No. 2 apples shall be hand picked from the trees, but shall not be smaller than two and one-fourth inches. The skin must not be broken, and must not be cut. They planned that they would pay the growers about sixty cents per bushel if fruit was rejected. Now, however, the apple buyers insist up with wormholes. I think that is a great step forward. If the men who handle our fruit have finally decided on some standard it is a big step forward. One difficulty in the past has been that a No. 1 apple shipped out by one man has been one thing, and a No. 1 apple of some one else in an adjoining township has been another thing. There has been no standard in

our Pomological Society and fruit societies. They should have done that rather than have let the dealers do it.

There is another question that I want to touch upon, and that is the question of mulching our orchards. The question of mulching has been an experimental one. While I am interested in the work of irrigation I must say that where the land has been thoroughly tilled in the middle part of the growing season as much as it can be from that time up to the harvest time, and then has been mulched, it has shown better results than from the application of water. Culture and mulching together in our orchards have shown greater results than by the use of a great amount of water and less culture.

In this question of the apple which our Governor touched upon so pleasantly yesterday there has been a wonderful awakening. The people are awakening in Connecticut. The people are awakening all through the northern states to the fact that this section of the country has a peculiar adaptability to apple culture. There has been a great awakening in this respect in the last two years. We are becoming aware of the fact that Connecticut and the New England States form the great apple growing section of America. Carry that fact West, Governor Hoard, if you want to, and tell them that when you go down into the Ozarks where they raise the Ben Davis. Tell them that the people of the East and New England are producing the best apples in America; that is the everlasting fact, and yet we have been asleep to it all these years, and have let the West send inferior fruit in here to take our market. Connecticut and all New England in the future is to be the land of the good red apple. We are awakening to the fact and are gradually coming to know enough and to see that the rough hillsides of Connecticut are in the future to be covered with apple orchards, which is going to make a great difference with Connecticut agriculture. New England is to be the home of the good red apple. In New York, two weeks ago, I was talking with one of the largest handlers in New York city, and he was talking with one of the most extensive buyers. They were just on the subject when I walked up, and he said: "I am not going to buy any more apples except those that are raised east of the Hudson River. I am not going to handle any apples grown west of the Hudson River, because they raise a much better grade of apples east of that

division." He said further: "If I was a little younger I would take all the money I could get and go up into New England, and I would invest in some of those so-called abandoned farms, and plant every one of them with apple orchards, and in a few years I would have a gold mine." Mark you, that was a business man talking for dividends, and not for sentiment.

I have seen lately reports from the New Orleans market. I saw a letter from one of the largest handlers of fruit there. He said: "We are sick and tired of Western apples; good to look at, but poor in quality. Send us some Eastern apples. No matter what they cost. It is the only apple that goes here. It is the only apple that keeps a long time in our climate, and the only apple that remains good when it is packed." Now, that is something for us to listen to.

Some people laughed at my friend Hoyt when he said that he proposed to set out young trees and get good returns in seven years. He believed in cultivating, and he said that they would begin to bear some fruit in four years. They thought he was crazy, they said it pretty near to his face; but I know of apple orchards in the State of Connecticut that have been growing for only seven years along the lines that he suggested that are yielding two barrels of apples per tree. If they have been well cared for and they have been tilled as they ought to be there is no reason why trees of that age will not yield two barrels to the tree. It is a wonderfully good thing. Even for that quantity it pays a good profit at present market prices. With our soil and our climate there is no reason why we should not make a good thing out of this wonderful opening that is before us for apple culture. Up in New Hampshire there is a man who has put out an orchard of 7,000 apple trees, and they say he has 8,000 hens pastured in that orchard, making things lively for the worms. It is going to be a profitable industry for that man, and he knows it. It is going to be something for the vacant and abandoned lands in our State. Lands which have been almost abandoned for general agriculture in our State are going to be taken up and planted with good red apples. I know it. I believe in it. I have myself come down into New Haven County, within fifteen miles of this hall, and purchased two farms of such land apparently unsuited to general agriculture, and am planting with apple trees. I have torn the stone walls all away. I

have picked up the stone and put some of them in ditches, and got them out of the way any way I could. We have moved thousands and thousands of loads of stone, and have growing on there to-day 3,500 apple trees that are going to make life easy for me pretty soon. I like to take things easy as well as the next man, and I am going to. I believe they are going to help me to do it. I am doing it because I like to see apples grow, and I like to have things easy, and not have to work too hard besides. I am going to move all those old rocks I can and clear the land as much as possible; for every thousand dollars I shall spend in moving the stone I shall save \$2,000 in fertilizer bills.

We had another Wisconsin man down here some time ago, and I took him over there. He was a professor in your State, Governor Hoard. His name was Henry, and he was the head of your Agricultural College, I believe, where they have got 400 farm boys taking courses in agricultural study. We took him over to the farm that I bought, and showed him what was going on. He was much interested in the work of clearing off the stone. We showed him the dumps, and our method of gathering them up. They were what he called "dornicks."

I recommend an investment of this kind for all New England farmers who can go into it. It is not such expensive work as you think it is to clear off this rocky land. You can clear off the rocky land in the fall and early winter when your teams have nothing else to do, so that practically all the labor you need to pay for is the manual labor. If your teams were not doing this they might be standing still. You can get a wonderful amount of stone moved in that way, but you must own your teams that you operate, and not be to any considerable expense for that account. By moving the rocks at that season of the year you can clear a great deal of land at a small cost comparatively.

Ex-Governor HOARD. Do you use here what is known as a rock elevator?

Mr. HALE. Is it similar to a stump puller?

Ex-Governor HOARD. I drew off from my farm 172 of those large boulders of the northwest, some of them weighing as high as ten tons, with this machine. It is wonderfully

adapted for this sort of work. It is a machine that was invented within two or three years for removing heavy rocks, and is one of the most practical and efficient things I know of.*

Mr. HALE. I may have heard of that, but what we have done has been principally by main strength.

Now, while I am speaking upon this point let me say that from the experience I have had so far myself and from observation in the orchards and from the State of Connecticut land values at the present time, I think there is no investment that capital can make in the State of Connecticut at the present time that will give such great and such sure dividends for a long term of years as by buying Connecticut lands at present market prices and planting them with good red winter apples. It is a business enterprise that will take considerable capital, and yet pay a royal good dividend upon it. We have a market here, and a growing market for high grade fruit. One great trouble in this section has been the West has sent us a lot of those infernal Ben Davis apples that have shocked the taste of the consumers everywhere, and for every barrel of inferior apples that they have sent us it has blocked the sale of five barrels of good apples. But besides our wonderful markets here at home and the wonderful growth of our markets, people are using more and more of fruit per capita. The people are demanding for use for breakfast, or before breakfast, more fruit than they ever have before. We want to encourage this state of affairs. We want to encourage the use of this wholesome and nutritious food. The more the people can eat the better they will be, and the better we will be, too. But beyond all that, we have another advantage right here on the Atlantic coast, for with the ferry boats going across the big water every day, with the magnificent markets of Great Britain, and the continent of Europe almost at our very door, we can get there as cheaply as some other sections of this country can to our markets. We must avail ourselves of this great opportunity which is opening up before us. We have learned from our experience and from the experience of others that if we are going to avail ourselves of these foreign markets we have got to grade our apples and our fruit to suit their tastes. And we must learn to practice the maxim that

* Bolles' rock-puller has been used successfully in Connecticut for fifty years.

T. S. G.

"honesty is the best business policy." We have made a bad reputation in the foreign markets. When we ship apples it will not do to put second grade stock in the bottom of the barrel and put a few good ones on top, and expect that we are going to hold our trade and have those markets pay us for first class apples. It will not do to ship second grade stock, and pay freight over there on it with the expectation that we are going to obtain first class prices. It is a policy that will ruin our prospects, and which will not pay us a single dollar. We have got to learn to pack our goods honestly and all our fruit that is sent there, and when that is done there will be a market for millions of barrels of apples which we may grow here.

The Paris Exposition, which has just closed, has made a wonderful exhibit of American fruit. From the day of the opening of that great show to the day of its close there has been a continuous and magnificent display of American fruits there, and it has made a wonderful impression upon all Europe. It cannot help but open the way to broaden our markets further and further away.

We have been talking the last few years a good deal about packing our apples in boxes instead of in those rolling barrels. What an abomination any barrel is when you stop to think of it. We have been talking about it for a number of years, but we have gone on packing in barrels, and no change has been made anywhere except in California and a little in Colorado, where they have packed their apples in boxes a little this year. The Californians have been doing it a number of years, and in that way have been shipping and selling inferior apples to what we can grow here. Inferior to what they grow in the middle West, but they have been carefully selected and honestly packed, and they have been shipping those apples three thousand miles and selling them in our own markets, and selling them in Europe because they were properly packed. This year for the first time apple boxes have come more or less prominently into the market. Bushel boxes and boxes specially designed for the packing of apples have been offered, and are advertised in the fruit trade papers. They are made at one place in Massachusetts, and at one place in Maine. They are made in Wisconsin also, I believe. They have been advertised quite prominently in the trade papers, and not only have the papers had notices of the boxes, but

pictures of them and a description of the material they were made of. I believe our method of packing in the future will be to a great extent on this line. This method has many advantages which are apparent to everybody.

Then, again, the storage of our fruit is coming to the front more and more. As I spoke to you a little while ago about the late sale of our apples early in the spring. If our packers were able to hold the fruit until later in the season they would realize much higher prices. They have not been able to do that because we did not have proper facilities. Those who have tried cold storage have been well satisfied, and it seems to me that in large cold storage plants where every facility can be provided for the keeping of fruit a long time lies one of the secrets of success in this direction. There is a growing feeling that we can follow the plan of the wine makers in foreign countries and of those along the Ohio River, and by tunneling into the hillsides make a cave or tunnel which shall be deeply underground, and use that for storage purposes without ice. When provided with double entrances so that none of the warm air of the outside shall be let in, and by keeping them closed during the summer and early months, except when we are putting our fruit in there, they may be made to work very successfully. There is an idea for a cold storage house that can be put up in a moderate way upon any farm. Furthermore, if we will consolidate our interests and have a large cold storage plant that will contain every facility it would help us to keep our fruit a long time, and thereby enable us to take advantage of the increased price which comes later in the season, and after our farmers have usually been in the habit of selling their apples.

With the growing foreign population in our midst, composed of people that live cheaply and yet well on brown bread and the juice of the grape, there is a wonderful growing demand for grapes for wine purposes. They are shipping in here from other states hundreds and thousands of tons of grapes in bulk, which our Italian residents and other foreigners among us are purchasing and making up into wine. They drink with their meals three times a day a plain sour wine made from the pure juice of the grape. They take a pint or a half pint bottle of it and a loaf of brown bread into the field, and on that diet they are doing some hard work which

our Yankee boys would flinch under. Our Yankees and some of our Irish must have beefsteak, but the Italian lives upon brown bread and the juice of the grape. They are demanding and needing a great deal of that product as a portion of their food, and it becomes us to feed them with what they need. There is a wonderfully good opening for the growing of grapes in this State for that purpose alone.

Another question which has come up in this section and touches me particularly, because so far as I know I was the first fruit grower in America to carefully grade his fruit, and then by following the Wisconsin plan of blowing my own horn, I called the attention of the public to it. I put labels upon my fruit, guaranteeing just what was in the packages. It has been a successful factor in my business, and as it was shown to be successful I had a special red label designed for my own peaches. Pretty soon one grower after another began to have red labels, and some of them thought they would not follow me quite so closely as that, and that they would have blue or yellow ones in color, or any color they might like which was all right. It was good for them and it was good for me. We all stood on our own bottom, but it has come to be that those who grow inferior fruits, and do not grow them well, are taking up some of my old packages and the old packages of other growers, and refilling them with inferior fruit and selling them again so that the value of the label on the fruit package is almost lost. A little incident in a neighboring State will illustrate my point. In one neighborhood there were sold a great many peaches from Georgia. There was one retailer who was the best retailer in the place, and he bought hundreds of packages and thousands of small baskets with my labels on. He has been very careful for the last two years to empty those baskets and packages, sending the fruit out to consumers without the labels, and keeping the packages back in his store. A while ago a bright idea struck him, that in view of the fact that those packages had established a local reputation, if he could buy local fruit he would go ahead. So he began to look around to see what he could get in a neighboring country town. He found an orchard. I will not tell you just what the name was, but it was that of a large association that was operating a farm and orchard. They were good men and good peach cultivators and had a fine orchard of peaches that were ripening on the trees, and this man came to

them, and he says, "I have looked all about, and I find you are growing the finest peaches of any one, and I would like to buy your whole crop, because I have a lot of labeled baskets of a brand that is favorably known to my customers, and I would like to keep supplying them with that same brand. Now, if I will bring those baskets up here, will you fill them for me with your peaches?" They were very much complimented by the proposition that he had selected their orchard above all others as the one that produced the finest fruit in the neighborhood, and as one that produced fruit that he was willing to let go out to his trade in the labeled baskets of another orchard. And to this day they do not know that Christ would have told them to have wiped the labels off before they would have filled them. They thought they had a good thing.

I am afraid I have got to abandon the labeling of fruits in that way, because there are so many people in this country that do not know what good honest business is. I am sorry to say that, but I am afraid it is the fact. If we can sell our fruit in a package that will be destroyed with the fruit, or when it is opened the label will be destroyed, it may be successful, but otherwise not. The retailing of labeled packages is injuring the man who grows good fruit and then labels it if his packages are refilled by some other grower.

We have had various troubles for the last few years in our business the same as they have in all businesses, but I hope that we shall have more, because the more troubles we have in our business, the more obstacles we have to overcome, the stronger and more alert we become. One special trouble that we have at the present time to contend with is the San José scale, which is with us everywhere. You may not have it on your farm, or I may not on mine, but it is in every orchard, and it is going to require our closest attention to keep it in subjection. We will be able to handle the mite which is attacking our trees, I have no doubt, which gives a sort of metallic appearance to the leaves; a little bit of a copper color to the leaves of our peach trees. In some orchards it has not very seriously interfered with the proper development of the fruit, but unless we can handle it properly it may be a serious menace to our fruit crop. The brown rot is ever with us in dry seasons, but we are learning more and more how to hold it in check. There are several of these kinds of troubles which are familiar to us to some extent, but which our Ex-

periment Station will have to find out how to handle effectively pretty soon. The apple scab is with us, and always will be until we spray as freely and thoroughly as we ought. The yellows that I spoke to you about before is being held in subjection in the largest orchards, but is spreading woefully in private grounds and in the orchards of small planters. Now, what do all these things mean to Connecticut fruit growers? What does this wonderful development of horticulture and this wonderful increase of consumption of our fruits mean? It means that if these matters that I have referred to can be successfully handled the future agricultural lines in Connecticut and New England will be assured. As I spoke before a broader market for our fruits is being opened at our very door, not only among our own people, but on account of the modern facilities for transportation to continental countries. Then all of our people who have the money to buy have a desire to buy, and that in itself has wonderfully increased our markets. As I have said over and over again, as people become more cultured in these thoughts and habits they become greater consumers of the finer products of the soil, and less of the coarser products; and that means in a business way that the refinement and intelligence of an eastern community make it the best and most appreciative buyer of fruit of the tree and of the vine. There are many such communities here in New England.

Just what fruits we shall plant depends upon local conditions, and I do not propose to go into that. The apple, of course, is king above all, and there is the peach and Japan plum and the grape and all the small fruits. You must judge for yourself what is best in your own locality and according to your own soil and local conditions.

There has been a wonderful advance in land values where fruit growing is going on. I know a gentleman here in this hall who has taken up some rough lands in Connecticut and planted them in fruit, and went to his next-door neighbor, who for years has been running his farm on ordinary agricultural lines, and has been willing to sell it or sublet it at a low figure, and wanted to buy an acre of land. To his surprise, up it went, two, three, or four times in price above what it had been held at. So it is in these localities where fruit raising has been started. If you want to buy it for fruit purposes, up goes the price. They say at once

you are making money out of your fruit, and you can make money out of that land. If you want it for old time farming purposes why, it isn't worth the taxes you have got to pay on it, but if you want to use it for the fruit business there is a money value in it at once. Where fruit raising is carried on there is a demand for more and better labor on the farm. It means a better reward for that labor. It means a wonderfully good opportunity for our boys and girls. When we were talking here yesterday about the boys and girls leaving the farm I thought fruit raising will keep them there. It means that our markets shall be more fully supplied, and it means that the people of the cities and towns will have more and better and more wholesome food. It means also that they shall have it at the lowest price.

Now, I want to speak just briefly on this question of packing again. Last spring there came to this country two bright and brainy young men from Belgium, graduates from their university there, and with a reasonable amount of money to travel about and see the world. They had been over Europe, and they came to this country to spy out the land and see what opening it gave for brainy and educated men to make their mark in life, and to make homes for themselves and families. They have been traveling up and down this land for the last six months looking at the different industries. They were not particularly wedded to any one thing, but within the last month or so they have reached a decision as to what they want to do. They have been astonished at the great quantity of beautiful fruit which they have seen in our markets. They have been astonished at the possibilities of our soil, and at the results which have come out of it. They have seen the beautiful specimens of fruit, and have investigated as to the enormous amount of it which is consumed, and they have decided that the fruit business is the business for them. One criticism that they have made, it seems to me, is something which a good many of us can take home. They say: "Why don't you fruit growers put up your fruit in a package that everybody buys? We want to buy some apples in a package, but we have to pay two dollars a barrel. We cannot take a barrel to the hotel. We cannot eat a barrel. If we want to buy a few you ask a great deal more than you do for a barrel. We cannot buy a few in a small, handy package. Why cannot we buy a nice package of apples to take to the hotel or to

take to the train? Why don't you put up all your fruit in boxes or in a size package so that a man can carry it easy and handle it?" Now, there is a good deal in that criticism. We ship a barrel of apples to the market, and it is offered to the trade at retail at two for five or three for ten, and it takes a good while to eat up a barrel at that rate, and the Dago gets the most of it. If we put that barrel in eight packages, nice neat packages, eight people purchase it, and they would buy a good deal more in that way and the barrel would be consumed much more rapidly, and then there is a demand for another barrel. When you send your peaches to market in large packages the retail dealer will have a price for a quarter, or for so much a dozen. You buy it and take it home to your family. If the fruit was put up in small, neat, and attractive packages and the market accustomed to selling those packages without breaking them, there would be more fruit sold and it would be much more satisfactory all around. It seems to me that these Belgians have given us a valuable hint and a big lesson in the way that growers should put their fruit upon the market. I think that is a wonderfully good business proposition.

That covers practically all the ground. I suppose I might talk all night in this rambling sort of a way, but I have touched upon these principal points. It seems to me that the greatest opening for Americans to-day in the East lies in fruit production. It presents the grandest chance for young men and young women. There are thousands of bright, brainy youths who are fitting themselves for the various professions, and who will go out into the world as lawyers, doctors, preachers, and scientific men, and there will not be one of them that will stand the same average chance of winning his way successfully in the world financially and building up a pleasant, happy home as a Connecticut farm boy will that will grasp the pomological problems of to-day, and carry them to their right conclusion.

A MEMBER. How do you account for the fact that the Ben Davis apple which you inveigh against is being sold in Boston and New York at higher prices than the best apples we are putting there?

MR. HALE. I don't account for it, because I do not believe it. The Ben Davis is a good looking apple, and what we

have got to do is to grow apples and make them look as well as the Ben Davis. It can be done. When we put nice looking, well flavored apples into those markets side by side with the Ben Davis, that infernal apple is going to take a back seat.

Mr. HINMAN. Mr. Hale said one thing that touched a tender point with me, and which also touched our friend Sanderson, and that is what he said relative to the fertilizer business. While I believe as he says that you can grow apples, and better apples with careful tillage, and do it better than you can without tillage, yet I believe that whatever you take from the soil you must put something there as a recompense. I do not believe the tillage will do it any more than water will. There was a time some twenty-five years ago when there was quite a furor over irrigation in Connecticut. I own land to-day that was irrigated at least fifty years ago. I have had a chance to observe that irrigated land right along. You let water run on to land, or irrigate it, and you will get splendid crops for a few years, but you take everything there is in there out of the land and when you get through you are done; you have got to start anew with that land and put back what you have been taking out with that water. Now, it is just so with orchards. If you continue to take everything out of the land and do not put anything in, you can do it for a short time, but you will find that by that process, if continued, you have got to begin again to bring that land up to where it was.

Ex-Governor HOARD. I am unable to reconcile two statements which Mr. Hale made. I think it is largely on account of my ignorance. I understood him to say that there was a wonderful impulse shown by the apple trees of the country in the spring of 1900, that all over the country there seemed to be a universal impulse in that direction among the apple trees.

Mr. HALE. I said fruit trees of all kinds.

Ex-Governor HOARD. Then it is true of apples anyway I understood Mr. Hale to say that continuous bearing was

just as much a natural aptitude of the tree as where they only bore in off and on years. Now, will he explain to me why it is that almost universally when trees are left to themselves, when you have a large crop here in the East we have the same big crop in the West, and when you have an off year we have an off year. I would like to know if you can tell me why it occurs.

Mr. HALE. I cannot tell about every individual tree. The general position is this: If a tree is healthy and vigorous it should develop fruit buds every year. The buds of this 1901 crop were developed last August and September, and of course they always have to pass through the winter in a partially undeveloped state on the tree itself, and the climatic conditions occasionally are such as to kill off those buds. If that is the case the tree does not produce any crop the coming year. Unless the tree produces buds, and those buds go through safely, it cannot bear. If they are killed for any reason, it just skips over and produces buds for another season, and develops an unusual amount of buds. The next year then we get a tremendous crop. Up to a few years ago nobody thought of thinning out the apples or picking them off. With such an abundance of fruit as sometimes is set, every limb will be breaking with fruit, and every one of those apples mature; they sap the life of the tree, and draw from its vitality. Of course that's an old story, and it is not necessary for me to explain anything about that. But with proper care, fruit growers generally are coming to understand that they can just as well have a crop every year. Of course climatic conditions have a great deal to do with it.

Mr. AVERILL. Isn't it true, Mr. Hale, that certain trees in an orchard will always bear on an off year?

Mr. HALE. Some seem to have that habit, some bear one year, and some another, but experiments have been carried on in a limited way, and experience has shown that with the proper feeding care, if the root is all right, so that the

tree can be properly nourished, it ought to be made to bear annually. Never allow a tree to overbear. With care you can get successful crops year in and year out with the occasional exception, as I have already indicated, due to climatic conditions.

Ex-Governor HOARD. What system do you pursue to get an annual bearing?

Mr. HALE. You have simply got to pick the fruit off and drop it so as to prevent the trees from overbearing.

Ex-Governor HOARD. At what stage do you do that?

Mr. HALE. Just as soon as the fruit is set and large enough. Sometimes trees do not bear from a lack of pollenization, or from some other local condition. This last summer on many of my trees I think nine-tenths of the set had dropped off when they were as large as hickory nuts, but when it is necessary the fruit should always be thinned out. Some have adopted the practice of sending boys up into the trees to pick it off or of putting up a ladder on the outside or even of using a pole. I do not know but what such a practice injures the trees some. It may bruise them some. Gentlemen who have practiced such methods tell me that it is very successful. It is a great deal cheaper to send up a boy and let him shake it gently. You have got to use your own judgment as to the method you pursue.

A MEMBER. I know of one man who had a pole rigged with a little steel hook on the end of it, and he went around and pulled them off in that way.

Secretary GOLD. We have come here in the shadow of Yale University, and we have enjoyed the address of the President, and I have now to announce to the convention that an invitation has been received from the Faculty of Yale for the members of the Board of Agriculture and their friends who have been present at this convention to visit the different departments of the university on Friday forenoon.

Mr. HINMAN. I move that the invitation from the Faculty

of Yale University be accepted, and that we return our thanks to them for their kind invitation to visit the different departments, and that so many of us as can, accept by visiting the college at that time.

Motion seconded and passed.

Convention adjourned to 10 A. M., December 13th.

MORNING SESSION.

December 13, 1900.

Convention called to order at 10.15 A. M., Vice-President Seeley in the chair.

The PRESIDENT. The question-box will now be opened for a few minutes. We have only a short time before we proceed with the regular lecture which we are to have this morning.

Secretary GOLD. What is the cheapest source of protein in cattle food to-day?

Dr. JENKINS. Mr. Chairman: I think it is cotton seed meal and foods of that class; with those feeds at \$24, and no great prospect of lower prices. Oil meal at present prices is a little more expensive. The gluten meals are also. We are just now beginning our annual examination or analysis of feeds.

The PRESIDENT. I would like to ask if the gluten meals are not coming nearer together in that matter than they were once; that is, if they are not more uniform in quality?

Dr. JENKINS. I do not think the glutens are growing any more concentrated, but they hold up their position pretty well. I do not think they are deteriorating. There was trouble last year with cotton seed meals not running up to what the manufacturers claimed. Gluten, you know, is often shipped in bulk in car loads from Chicago to New Haven or Hartford, and the lighter portion of the meal invariably comes to the top of the load, and the heavier portion sinks to the bottom. Now, if a man takes a sample out of the car and sends it to the station for analysis he may find that it has not got the

composition it should have. That is, if it is taken from some that is shoveled out of the car where it runs about even it may stand the guarantee very well, whereas if it is taken in others it may not; that makes some little difference.

Q. Can milk be produced at a profit for sale at a price of three cents a quart at the present market prices for feed for cattle?

Mr. HINMAN. That depends upon the kind of machine you use to produce it. Governor Hoard said here that a cow is a machine. You put food into the machine and you get a product. Now, with some cows you will get a very cheap quality of milk. A cow that will give forty or fifty pounds a day of milk may not take so much in value of food to produce it, and you can sell it for three cents per quart, and perhaps realize a profit, but, on the other hand, if you have got a cow that gives you a rich quality of milk, and gives a high percentage of cream, you could not afford to sell it for any such price. You would be out of pocket. Milk that runs as high as six per cent., and some cows will give that, is worth more than milk that only runs from one and one-half to two per cent. Furthermore, the quantity of milk from those two classes of cows may vary very greatly. In one case you may get fifteen or twenty quarts, and in the other case only six or eight, perhaps, so that it depends on what kind of cow you have got that produces milk, and in the richness.

Q. Is the sale and use of imitation dairy products in this State increasing or diminishing?

Dairy Com. NOBLE. Mr. President: I think that question might be answered "yes," and answered "no." As I understand it says "sale and use." I do not think that the sale is increasing, but there is a question whether the use of it is not increasing. On account of the high prices of butter for the last few years, and especially for the last year or two, when butter has been very high in price, there has been and is at the present time among some classes of people and cor-

porations a large consumption of oleomargarine which has not been exposed for sale. There are corporations in the State who are using quite an amount of oleomargarine. No question about it. There is no law that stops it; they are employing help, and they are using oleomargarine because it is very much cheaper than good butter. There are institutions in the State that are using oleomargarine quite extensively, and there is no law that prevents them from using it.

A MEMBER. I thought there was a law on that.

Mr. NOBLE. There is nothing on the statute books that hits these institutions so as to prevent the use of it.

Same MEMBER. Then there ought to be.

Mr. NOBLE. There are a good many families that are also using oleomargarine, having it come in ten pound tubs with their names on the tubs. It is not sold. It is used in private families. I have found quite a number in the eastern part of the State where they are having these tubs come in, simply stamped with the names on them.

The PRESIDENT. You mean it is purchased outside of the State?

Mr. NOBLE. Yes. It is not bought in the State at all. If it was bought in the State, of course, they would be liable for fraud. The high price of butter has had a tendency to increase the use of this product, and there is an inclination among some of those who are dealers to sell in delivery wagons, in some way to sell oleomargarine contrary to law. We have had cases in New Haven. There was a prosecution only last week where it was found that persons were selling oleomargarine contrary to law. In some cities in the State there has been quite an amount of oleomargarine brought in during the last year. It is brought in in such a way that it is very difficult to locate the ownership of it. Only a short time ago in one of the cities of the State there was quite an amount of oleomargarine came in billed in a way that no one knows who it belongs to, and no one knows who is going to

come to the depot after it. In some cases where we have kept watch of it it has been sent back to the factory; they were afraid to take it away from the depot. We have no control of it when it is in the depot. We can find out it is there, but we cannot take it, and we cannot do anything at all until we find it is on sale, or find it stored in the store. We have been very successful in some cases in preventing the sale and use of it in this way. Last year we found a ton and a half stored in one place. It was stored in the basement or in the cellar of a place where they did not keep butter for sale, but we had good proof of the ownership, and the butter people were prosecuted and fined the full extent of the law, although they denied that it belonged to them, but there was no question but what it did belong to them, or that they had it on sale. While the sale of oleomargarine I do not think is increasing, as I said before, there is probably more of it used than there was when butter was low in price.

If the Grout bill passes the senate, and becomes a law, it will stop this to a large extent; it will increase the price of oleomargarine ten cents per pound, because of the increased tax on it, and bring it up nearer to the price of good butter, so that the people who buy it will have their choice between an imitation and the genuine article. As it is now, it is in use in some State institutions that have been paying from eleven and one-half to twelve cents per pound for it; but with an increase of eight or ten cents per pound on it, the increase in price will have a strong tendency to drive it out, and prevent the use of it. It has been used quite extensively by some corporations employing labor, and in town houses and places like that, and if this bill passes with the consequent increase in price which will result, it will open the door so that good butter will be used in place of it. There is no way to stop its being used now in that way.

Professor BREWER. Does very much of it come in here for

use by vessels? There has been, as I understand, a considerable use of it for that purpose.

Mr. NOBLE. I don't know that there is. I think that there used to be in New London quite a quantity of oleomargarine sold for that purpose, but there is none of it brought into the State now that is sold for that purpose that I know of.

Mr. HINMAN. I think we are all agreed now that people may buy what they want as a question of law, and the only question is whether the consumer shall be cheated by buying what he supposes is butter, and which is not. I have always held that if any one wanted to buy oleomargarine and eat it they should have just the same privilege to do it as the Chinaman has to eat rats. I don't think we would have any right to insist upon a law that the Chinaman should buy beef if he would rather have rats, but if a man wants to buy oleomargarine when it comes to him labeled for what it actually is and he buys it with full knowledge of what it is, I don't think we have anything to say, but, of course, that has been just where the trouble has arisen. It has not been sold for what it actually was, but has been sold for butter. I should like to see every pound of it sold under a revenue stamp so that when a man bought it he would know exactly what he was getting.

Mr. NOBLE. I have understood, and without any question, there are farmers in the State who are using oleomargarine, and who are assisting in its manufacture. There has been a milk train started within the last year to carry milk to Providence to an oleomargarine factory. The farmers in that section of the State are furnishing milk for that factory, and they are running that milk train to carry the milk for that factory. They use quite a quantity of milk and cream in the manufacture of oleomargarine, and the farmers are furnishing it. The factory is paying good prices, which makes an inducement for the farmers to sell their

milk there. One man was telling me that he got better prices than they could to send their milk to Providence to be sold as milk.

A MEMBER. Mr. Hinman says that he don't care about the consumption of rats by a Chinaman, if the Chinaman knows what he is getting. I am sorry for him, the same as Governor Hoard said he was sorry for the man who blew out the gas. I want to ask Commissioner Noble if these manufacturing corporations that keep boarding houses where oleomargarine is used are not obliged to put up signs that oleomargarine is used?

Mr. NOBLE. That is a question it is hard to tell. We have taken counsel on that subject, and we found that it was a difficult matter to draw the line. It is hard to tell just what the legal definition of boarding house is. A farmer who has one or two men and boards them under the same ruling would be obliged, if he should buy oleomargarine, and had any one in his family beside his son and himself, or his wife and children, to do that. If he had a hired girl or a hired man and they used oleomargarine under that, they would be obliged to put up a sign on the same ground that a man who hired ten men would be. At least that is the counsel which I have been given. That is, that one man boarding one man would be in precisely the same situation as a man boarding eight or ten men. That is, if a farmer hires a man or two men at so much a month and their board, he would be in precisely the same situation as the man who hired ten men.

Mr. SEELEY. I don't care what the lawyers think, but I want to know what Mr. Noble thinks about it. If a farmer hires a man and takes him into his family, does the law regard him the same as the boarding house of a factory?

A MEMBER. Mr. Sanford up in Tariffville boards State paupers. He has so much a week. Can he use oleomargarine?

Mr. NOBLE. There is no question but what many of these firms and concerns that run brick yards know that they are

using it. As a matter of fact, a great many of them are using it. Every one of them who use it know it, but there is a legal difficulty on that question. I have great hopes that with the passage of the Grout bill it will be of material assistance to us in stamping this thing out, or at least putting it into a situation so that those who do use it will not palm it off as butter. That is the great objection.

The PRESIDENT. My experience in connection with the "Five States Milk Producers' Association" has taught me that it is a good thing for the citizens of neighboring states to get together and exchange ideas. We can get a great many good points from outside of our own State, and we get them in that way where we would not get them within our State, and the Board of Agriculture have thought this same thing, and they have brought a gentleman here to speak to us this morning from the grand old State of Pennsylvania. He is to speak to us this morning on forestry. I am very happy to introduce to you Dr. J. T. Rothrock, Harrisburg, Pa.

Dr. ROTHROCK. Mr. President and gentlemen: I can speak from experience when I say that I thoroughly agree with the remarks of the presiding officer as to the great benefit which may be obtained in the case of an interchange of ideas by gentlemen from other states visiting each other. I am myself an illustration of that. In the address that I listened to last night on fruit growing, I could not help but think how closely allied it was with forestry. It was a revelation to me, and a stimulation to me. I feel that I shall go back to my own State very much better for having heard it, as I shall also from hearing this discussion this morning. For you know we have been having more or less discussion down in Pennsylvania over this subject of oleomargarine, and it will be with a sort of pleasure that I shall be able to go back to the State of Pennsylvania and say that we are not the only pebbles on the beach, for there are others I find outside of the State of Pennsylvania who are selling and using oleomar-

garine, and, from all accounts, it seems to be widespread. It is a mechanical sort of pleasure, but I am glad to know that Pennsylvania is not the only State that is having trouble of this kind.

After listening to the address of Mr. Hale last night I asked myself the question whether you wanted any forestry here in Connecticut, whether there was any piece of ground in the whole of this commonwealth that was too rough to be turned into an orchard? However, from the fact that you have established in Yale University a School of Forestry, and from the fact that this State Board of Agriculture has seen fit to bring the subject before you for consideration, I think I shall have to come to the conclusion that there is an interest in Connecticut on this subject, and it certainly is well adapted to the growth and cultivation of forests, as well as to the growth of fruit trees. The establishment of the Yale School of Forestry marks a distinct advance in this branch of knowledge, as you may know the field end of it is located in Pennsylvania, and you have only one end of that department of Yale in your State. We have every reason to believe that whatever Yale University undertakes will be well done, and we have been very much pleased, indeed, to have the field end of this important department located in our State. As the Forest Commissioner for the State of Pennsylvania I shall be very glad to allow the school to use our State lands in any way they desire for carrying on their system of experimentation. I beg to repeat that we are very glad to welcome this new enterprise to Pike County, Pennsylvania.

SOME ASPECTS OF THE FORESTRY PROBLEM.

DR. J. T. ROTHROCK, HARRISBURG, PA.

Gentlemen of the Connecticut Board of Agriculture: The dictionaries in one sense mark the growth of ideas. They seldom if ever coin a word until the need for it is apparent, or

give a clearer definition of an existing term than its ordinary use warrants.

If we were to turn to a German dictionary a century old we would discover that forestry had already taken its place as a well-established art, and that the forester was one who was charged with every detail of the forest crop, both in maintenance and in restoration.

If, on the other hand, we take a Webster's unabridged dictionary, which is but half a century old, we shall find that the word forestry is not given, though we are told that a forester in England "is an officer appointed to watch a forest, preserve the game, and institute suits for trespasses." In other words, he was merely a policeman, and there is no indication that he ever received a technical education or knew one tree or its use from another. So far as the United States were concerned neither forestry nor foresters were found here half a century ago.

I find that Worcester, of much later date, gives essentially the same definition of the word forester, though he has advanced a short step by defining forestry as the art of forming or cultivating forests, and gives the Saturday Magazine as his authority.

No one who is up to date would now be content with any definition of the word forestry unless it included every element in the production, protection, felling, marketing, and restoration of forests. The definition would convey the idea that the forester was a man of liberal education and of special mental attainments.

These statements are, of course, of no interest except in so far as they indicate that a change has taken place here, that a new idea has been introduced into our civilization, and starts us to inquiring what causes have led to this change.

Perhaps it would not be premature here to indicate what steps have already been taken in the new direction in this country. 1st. The general government has already set apart 46,828,449 acres of the public domain as forest reservations. 2d. The State of New York is already in possession of more than 1,000,000 acres as a forest reserve, and hopes to add at least two million acres more to that which it already possesses.

3d. Pennsylvania has purchased nearly 150,000 acres during the past three years, and will probably not stop until at

least 2,000,000 acres have been converted into a well-timbered forestry reservation.

4th. The states of Michigan, Wisconsin, and Minnesota, seeing the disappearance of their forests, are now actively striving after some plan by which their lumbering industries may be perpetuated.

5th. Maine, too, and Massachusetts have in one way or another sought the restoration of their forests, on such ground as is not better adapted to other crops.

Clearly then there is some force at work which has introduced this change in our ideas about forests. This is the very first generation of native born citizens that entertained any ideas concerning perpetuation of our timbered areas. All who came before them were concerned mainly with converting timbered into cleared land, nor can we wonder at it, because whatever came afterwards, the daily bread was produced upon the farm, and not in the forest.

It is hard to say with certainty to what this change is mainly due. Probably to several causes, rather than to a single cause.

It was easy enough, back in the seventies, to recognize that, as a whole, over the entire land, forests were being cut faster than they were being reproduced. But this alarmed almost no one, for we had such boundless faith in the resources of the country that no anxiety was felt. Then there came statements more or less clearly made and substantiated that removal of the forests was diminishing the rainfall of the country. After years of attention to this statement the worst that can be said of it is that it is not proved that the presence or absence of forests increases or diminishes the rainfall of any region. It was charged later that as we removed the forests we invited the tornadoes which were so frequent in the treeless regions of the West. This, too, proved to be a false alarm. But whatever else was uncertain there was one thing to which practical men had pinned their faith, namely, that from some cause or another there was a change in the water power, and that it was associated with removing the forest cover from the land. They could trace it from where never-failing springs became wet weather springs only, down the channels of the streams to where in late summer and early autumn the wheels of mills and factories that, in former days,

ran throughout the year, now halted and waited because there was not water enough to turn them. This was all true enough, but we were still far from the full solution of the problem. It was quite sure that the rainfall was as great as ever, but it remained to be shown that the quantity of water which ran off through these channels, when we considered the whole year, was probably as great as when the entire country was timbered. At least such seems to be the verdict of the most recent investigators. The whole truth boiled down seemed to be this. Forests conserve what rain does fall, and by preventing excessive freshets through increasing the absorbing power of the earth's surface they distribute the water more evenly throughout the year. What subsequent modifications this truth may receive, it is probably substantially correct as stated.

But this brings with it a train of events which is of immense importance. So long as water remains in the soil there is a reserve power upon which we may count in time of need.

When it becomes aqueous vapor and flies to the sky its usefulness to us is in doubt, and when it rushes out of the country in a flood not only is its usefulness uncertain, but its destructiveness is sure. In other words, forests enable us to retain the rainfall in a useful condition for gradual distribution throughout the entire year. Not only do they lead the rainfall into the earth where it is safe against immediate run-off and evaporation, but they do more than this: they actually, out of the surplus which they have saved, return more aqueous vapor to the atmosphere during the growing season than a like area of cleared ground in any ordinary farm crop could do. How important this vapor is does not appear at first sight. It is well known that, coming from above, the heat of the sun can, in a great measure, penetrate through the moisture in the air, and reach the earth to be absorbed by it. On the other hand this same heat when radiated back during the night cannot fly off into space if a cloud intervenes. Hence, then, the watery vapor becomes, during the early autumn months when our crops are maturing, a sort of blanket for the earth. The larger the area from which this evaporation can occur the larger will be, other things being equal, the amount of watery vapor in the air. The less we have of this vapor the greater will be the chances of early and destructive frosts, and the

more likely will our crops be wilted, because the thirsty atmosphere will, so far as it can, take the moisture from the plants themselves, and from the soil on which they grow. What-ever, then, tends to preserve the areas of evaporation tends to that extent to preserve our crops. The quantity of water evaporated in a summer month from a mile square of water surface is enormous. It has been estimated to be in our climate 3,339,304 gallons. To make a practical application of this statement: sum up the area which, in your State, should normally be covered by water. Reduce it to miles, then multiply the number of gallons which I have given you above, for the month of July, by the number of miles of water surface which your State represents. You will be astounded at the result. If you have fifty square miles of such surface you would have the atmosphere receiving in a single month 166,965,200 gallons of water.

Suppose we change the picture and imagine, what is not improbable, that just at the season when your crops most require water vapor in the atmosphere that your evaporating surface has been reduced one-half because of the low stage of water; that would mean that the atmosphere over your State had been deprived of 83,482,600 gallons of water in a single month. I am as fully aware as you that it is still an open question whether or not the moisture which comes as dew upon the plants can be absorbed by them. That is a purely scientific question. You and I know, however, that corn leaves which were hanging limp, or were curled up to reduce their evaporating surface, when the sun's rays were pouring down upon them, will be refreshed after a night of heavy dew. During a prolonged drought you may endeavor to maintain capillary attraction from the depths of the earth by keeping the soil well tilled. The stubborn fact remains that there is only a given quantity of moisture there, and that while cultivation may render more moisture available to the plants for a time, it is also enabling the air overhead to carry off the more from the soil when other evaporating areas are reduced in size.

I spend most of my time in the woods in connection with my official duties. From November 20th to the 27th I was in camp at an altitude of 2,000 feet above tide on one of our State Reservations. When we entered the woods, springs which had almost never been dry had ceased to flow. Stream

beds were dry, and the whole country showed signs of suffering from want of water. Never in the history of my State, certainly not for a generation, had the agricultural interests in the central parts of Pennsylvania suffered so severely from lack of water as during the last summer. In the great city of Williamsport, where prosperity had been built upon the lumbering industry, the mills had long been "shut down," because there had not been enough of water in the Susquehanna to bring the logs into their boom. It rained on us most of the time during six out of the seven days we were out, and every night the heavens were opened, and the floods descended upon us.

Yet it was not until the fields were pouring their water into the channels that the "run off" from the woods became manifest. Most of the water which fell on the litter of leaves during the first four or five days went into the earth. This observation led to another. As we were going out of the woods we found that the water which soaked into the forest floor had already started the springs to flowing, but when we reached the open country the springs were not flowing so vigorously as those we had left in the woods, because most of the rain, running off of the surface of the fields, had failed to reach the subterranean channels. This observation, too, effectively disposed of a statement made but a short time ago by an "eminent authority," namely, that it was the snows, and not the rains which maintained and restored our springs.

It is true that meteorological observations upon the relations of forests to climate are unsatisfactory, because too meager. But it does not follow that we are, therefore, to reject certain conclusions which our unaided senses bring us. There was much weather wisdom before this science of meteorology was born, and some of that wisdom was as reliable as the weather forecasts we receive to-day. And by this statement I mean no discourtesy to those patient, trained observers who are trying to reduce to order the laws of meteorology of this great country. The work is of lasting benefit.

But it is true that Columbus was denied the privilege he asked of entering the harbor of San Domingo, which he had opened, to ride out a storm which he foresaw, when Spain's treasure fleet ignorantly put to sea only to be dashed to pieces. I remember as a boy a statement which was so uni-

versally considered true that it passed into a proverb, "the green woods won't burn." I have lived to see the air in the green woods so dry that a match dropped among them would ignite the leaves in them as if they were straw in your fields. I remember when the forests of Pennsylvania stretched away mile after mile — and you might travel an entire day without seeing more than a single house. At that time when a lumber camp was opened in the wilderness it was almost impossible to dry the wash of the week as it hung upon the line, because from April to October, during most years, the woods reeked moisture. But as the cleared areas of evaporation increased in extent, the tree-shaded areas of moisture-retention decreased in extent. To-day the dry atmosphere makes cleanliness and godliness possible anywhere in Pennsylvania. These statements may appear trifling, but they are important in helping us to conclusions while our meteorological friends are bringing up their data. When they are prepared to substitute something more exact and accurate, I pray that they may have a speedy delivery.

I have been asked repeatedly during the past season, why is it that, ninety-eight years ago, when the country was covered with forests, that a stone in the Susquehanna River at Harrisburg was bared by the low water and marked, and that never until this season has it been seen again uncovered. The question is apropos of the forestry agitation, but it is easy to answer. Presence or absence of forests has not been shown to increase or to diminish rainfall. There is everything to lead us to believe that there always have been and always will be years of exceptional drouth. All that we claim is that in a forested region a given rainfall will produce more lasting results for good than in an open country. For aught we know to the contrary, the greatest drouth that has ever fallen upon this land may have been before its discovery by the whites.

There are certain inquiries with which it seems almost a waste of time to concern ourselves. For example, the question whether or not removal of our forests will permanently injure our atmosphere and render it less fit for animal use than it now is. We look about us, and up into space, and are struck by the small room which we mortals require, and we learn that so rapid is the atmospheric diffusion that but little if any difference can be detected between the air

of a forest, or of the desert of Sahara, or the air over a vast city, and our fears are allayed.

But, on the other hand, it is said that a no less distinguished scientist than Lord Kelvin has seriously raised this very question. He points to the fact that the oxygen of the air seems to be a fixed quantity, and that plant life is, if not the only producer of oxygen, at least the most active one. He leaves the conclusion where I will, to you.

These are some of the outlying considerations of forestry.

Would it be wise to give our cleared fields over again to forests? Not at all. Forestry is nothing if not practical. The reason why I have devoted twenty years of my life to this work in my native State is because I have seen one-sixth of its area changed by removal of the timber, from a productive to an unproductive condition, and I desire to see it made productive again. If your acres pay you in farm or garden crops better than they would in any other crop, then you would be most unwise to make any change. But, perhaps, your land may vary in quality, and some of it may compensate you for your agricultural operations, and some of it may not; what are you to do with that which does not pay you to farm? Clearly, it ought to produce something in return, at least, for the taxes which you pay upon it.

I admit that the most valuable timber is of slow growth, and that if you depend upon this it must be as a legacy to your children. We have in Pennsylvania two laws which, however, turn such land into an immediate source of profit if planted in timber. They are as follows:

An Act for the encouragement of forest culture, and providing penalties for the injury and destruction of forests.

Section 1. Be it enacted, etc., that in consideration of the public benefit to be derived from the planting and cultivation of forest or timber trees, the owner or owners of any land in this commonwealth planted with forest or timber trees in number not less than twelve hundred to the acre, shall, on making due proof thereof, be entitled to receive annually from the commissioners of their respective counties, during the period that the said trees are maintained in sound condition upon the said land, the following sums of money:

For the period of ten years after the land has been so planted a sum equal to ninety per centum of all the taxes

annually assessed and paid upon the said land, or so much of the ninety per centum as shall not exceed the sum of forty-five cents per acre.

For a second period of ten years, a sum equal to eight per centum of the said taxes, or so much of the eighty per centum as shall not exceed the sum of forty cents per acre.

For the third period of ten years, a sum equal to fifty per centum of the said taxes, or so much of the said fifty per centum as shall not exceed the sum of twenty-five cents per acre.

Provided, that it shall be lawful for the owner or owners of the said land, after the same has been planted for at least ten years, to thin out and reduce the number of trees growing thereon to not less than six hundred to the acre, so long as no portion of the said land shall be absolutely cleared of the said trees;

And provided also, That the benefits of this act shall not be extended to nurserymen or others growing trees for sale for future planting.

Sec. 2. The owner or owners of forest or timber land in this Commonwealth, which has been cleared of merchantable timber, who shall, within one year after the said land has been so cleared, have given notice to the commissioners of their respective counties that the said land is to be maintained in timber, and who shall maintain upon the said land young forest or timber trees in sound condition, in number at least twelve hundred to the acre, shall, on making due proof thereof, be entitled to receive annually from the commissioners of their respective counties the sum of money mentioned in the first section of this act: Provided that the first period of ten years shall be counted from the time that the said land has been cleared of merchantable timber, and, that after the said first period of ten years, the number of trees upon the said land may be reduced as in the first section is provided. This act was approved the first day of June, A. D. 1887.

An Act for the preservation of forests and partially relieving forest lands from taxation.

Section 1. Be it enacted, etc., that in consideration of the public benefit to be derived from the retention of forest or timber trees, the owner or owners of land in this Commonwealth, having on it forest or timber trees of not less than

fifty trees to the acre, and each of said trees to measure at least eight inches in diameter at a height of six feet above the surface of the ground, with no portion of the said land absolutely cleared of the said trees, shall, on making due proof thereof, be entitled to receive annually from the commissioners of their respective counties during the period that the said trees are maintained in sound condition upon the said land, a sum equal to eighty per centum of all taxes annually assessed and paid upon the said land, or so much of the said eighty per centum as shall not exceed the sum of forty-five cents per acre: Provided, however, that no one property-owner shall be entitled to receive said sum on more than fifty acres.

Sec. 2. All acts or parts of acts inconsistent herewith are hereby repealed.

This act was approved the 25th day of May, A. D. 1887.

Either of these laws may be considered in the light of a bounty on timber culture, even though it is "not so nominated in the bond."

Is such a law just? If forests are equalizers of water-flow, leaving all other alleged benefits out of the question, then they are clearly an advantage to the entire State. So long as the owner does not cut and remove them he is receiving but little more advantage from them than his neighbors. It seems hardly fair, in this view of the case, that he should be asked to pay all of the tax. The tax rebate allowed under our laws is simply an acknowledgment which the State or the community makes of the public service trees are rendering. It is what the public allows as its share in the taxes the owner has paid for the trees.

You may consider this from another standpoint.

You allege that this timber is growing into increased value which the owner shares with no one, and therefore you contend that no one should share the payment of tax with him. This statement is true, considered in itself, but the fact remains that every day these trees stand they are earning, from the public, the right to grow by the public benefits which they confer.

If, however, you still insist upon payment of full taxes for timber land, then it would be equity to defer payment until the owner converts his timber into cash by turning it into

lumber. It would then come in the shape of an income tax, which is not wholly unknown in this country, and would be paid when the owner had lost his claim upon the public by removing the trees which earned the right to grow untaxed so long as they stood.

These considerations come upon us as we consider the question from a legal and a commercial standpoint. There is, however, still another aspect of the case which may in the near future confer value upon even your young growing forests. We will suppose you own a body of land which is unfit for agriculture, and is yielding you nothing. I do not know of anything which could be worse than this, unless it should be an actual expense to you. Suppose you plant that land in white pine. It will be a century before any return will be yielded. It is easy to conceive of a class of investments which will yield a safe return of interest and principal only after a long term of years. Yet because of the certainty of a return these investments would have a value which increases in proportion as the period of maturity approaches. If there is any timber in the world which has a value beyond a doubt it is white pine, because it fills a place which is peculiarly its own. There is no more danger that the market will ever have a surplus of white pine than there is that the world will ever have too much virtue. The supply of either will never equal the demand. It is my opinion that there are thousands of acres of land in this State which might be planted in white pine to advantage.

But if its maturity is too far in the future, suppose we consider another tree: the Carolina poplar, for example. Taking its average growth on all soils, I do not know of another tree adapted to our eastern slope which grows so rapidly.

You may put it into almost any soil that I know of as a cutting a foot long, and in three years you will have a rooted tree six feet high. From that period on for twenty years on soil of average quality it will increase rapidly in height, and add an inch to its diameter annually. But a few years ago it had almost no value except as a second-rate shade tree. But our pulp makers have ransacked the continent for suitable wood for their mills, and they have decided that the Carolina poplar has a value in their work, and that by the soda process it will make a fair quality of paper. One company informs

me that it proposes to use forty thousand cords of it this year, if it can get so much. Our Pennsylvania wood pulp makers are already planting it for their use.

It would seem wise, therefore, for us to consider some of the possibilities of the Carolina poplar, as it appears to be adapted to your climate. There may be planted of it say 400 trees to the acre. This would allow each tree about ten feet of space in which to grow. Planting them closely would cause them to make straight, tall stems. In from fifteen to twenty years each tree should make four lengths of pulpwood, that is, a cut twenty feet long having a diameter of one foot at the base and nine inches at the top. The cubic contents of this would be, allowing for removed bark, over thirty-four cords of wood to the acre. I have given here what I conceive to be the lowest average yield. The chances are that the yield would be a fourth larger. Now, mark, this is to come from land which is incapable of producing any farm crop. There is another method of producing Carolina poplar. I mean as road-side shade trees, when, after they had served their purpose, or a younger set was coming on, the older trees could be removed. The aggregate of money which this State could thus produce to advantage would be very large. All that I have said of the poplar is true of its near relation — the willow, except that the latter requires rather moister ground. It was my intention to have the merits of the white willow tested as a producer of pulp wood when I discovered that it was already being used successfully by one of the paper mills of my State.

In addition to the trees already enumerated, willow culture for basket making appears to have a future. If this be so the return will be speedy. I am not fully informed upon this subject, but would say so far as I can learn those who have gone into it in Pennsylvania seem to be satisfied with the results.

I have said nothing thus far upon the question of State ownership of lands. Whether or not this is desirable would, I suppose, depend somewhat upon the waste land which any State possessed. In Pennsylvania there happen to be several millions of acres which most men of common sense recognize is good for nothing but the production of timber.

If it were to be given over to a kind of trees which require half a century or more to mature, it would in time be

a valuable investment to the State, but forestry there, as here, is a comparatively new idea. Men lacked enough faith to go into it as a business.

The State saw its opportunity, and within a year has purchased about 120,000 acres at a cost of \$1.35 per acre. This is but a nucleus. We are contemplating forestry reservations which, in the near future, will contain about two million acres. There is one thing about the movement in Pennsylvania which is somewhat remarkable, though it is eminently satisfactory to those who have been doing pioneer work in favor of forestry. It is, instead of having to lead public sentiment up to acquiring larger reservations, public sentiment is urging the forestry commission on.

I do not know what proportion of Connecticut could be classified as waste land, probably less than in Pennsylvania. But, nevertheless, I am persuaded that there are areas within your limits which it would be well for Connecticut to own. We have three methods of obtaining land for the State.

1st. The commissioner of forestry is authorized to purchase land which is sold for non-payment of taxes, at a price not to exceed taxes and cost. In this way we have secured sixteen thousand acres at an average cost of about thirteen cents an acre. It was land which was worth much more, but it so happened that we secured it. For example, one tract of 4,175 acres cost us fifteen cents an acre. Yet we have on that very tract a flagstone quarry which we could sell for more than we paid for the tract.

2d. The commissioner of forestry may, with the consent of the governor and board of property, purchase land other than that sold for taxes at a cost not in excess of its assessed value, but in no case to pay more than five dollars an acre.

3d. We have a commission of five members whose duty it is to locate three State forestry reservations of not less than 40,000 acres in each, one to be upon the heads of each of the three river systems of the State.

This commission is not limited to any price per acre. It has the right of eminent domain, and may take any land for State purposes upon payment of a reasonable price. Thus far this right has never been exercised, because it has not been necessary.

There is one feature of our reservation system which is worthy of note. It is the interest the public have in it for other than mere practical reasons.

Hitherto no State appears to have recognized the right of its citizens to a holding which was the common property of all, except in or near large cities. This idea has with us gradually assumed an importance in the forestry movement. Nothing has done more to make land purchases popular in Pennsylvania than the fact that our notices posted on State lands plainly indicate that lawful hunting and fishing are allowed.

This means more than appears on the surface, for no one can lawfully, in our woods, kill a song or insectivorous bird, and within less than a year means will be provided to punish those who do. This idea of public ownership has brought to the side of forestry 40,000 members of the State Sportsmen's Association. For that body is not organized simply to ensure a full game bag; but to perpetuate the game of the State by limiting the period during which those species, which are properly game, may be killed, and to protect all the other useful denizens of the woods during twelve months of the year. Game never, during the past twenty years, has been so plenty in my State as now. Hundreds of our citizens now take their annual vacation during November, and go to the woods for it. I saw recently ten deer and a bear hung up in a space of less than two miles in our Clinton County woods. Thus, by our reservation we are providing protection and shelter for the birds which are the natural enemies of the insects which prey upon our crops, and we are providing an outing ground and a sanitarium for our citizens. The governor of Pennsylvania recently stated in conversation with State officials that it was his desire to have something of a forestry reservation in each county in the State. I do not know how this may strike you as an element of the forestry problem, but I assure you it has become with us so much of a popularizer of the movement that I frequently hear the remark made by our citizens, this or that piece of woodland ought to belong to the State.

Apart from all the minor considerations to which I have alluded and to which I have alluded because they are so seldom considered, there remain two facts upon which most of the interest of forestry will depend.

First, that the country must have wood, and our supply is becoming scarcer as our population is becoming larger.

Second, if we are obliged to buy wood we expend money. If we sell wood we make money, and if the wood is raised upon soil which is otherwise unproductive, it is so much clear gain.

One point more is worthy of a moment's consideration. The pulpwood is of growing importance, because in the first place the demand for woodpulp is increasing and the supply can be more speedily produced than we can produce lumber, and because while the lumbering industry gives employment to labor but part of the year the pulp industry affords employment all the year, and because a cord of wood manufactured into paper may be worth forty dollars, and a cord of wood in the form of lumber would be worth but about seven dollars.

It should be added that sprouts from stumps of such species of oak as produce tannin in paying quantity should be protected especially against grazing cattle, because they may grow into value in from fifteen to thirty years, and the demand for this must surely increase. It is well known, too, that the best bark, producing the most tannin with the least loss, comes from young, and not from old bark.

I thank you for your attention.

Secretary GOLD. There is now an opportunity for any question or for discussion on this topic which we have had so finely presented by Dr. Rothrock.

Professor BREWER. I would like to say a word on this matter. It is not an entirely new subject to me. I have talked to our farmers before about woods and woodlands of this State. Some twenty years or more ago I spoke at one of our Agricultural Conventions upon this subject, and at that time gave the legal definition of forestry as it was formerly understood. In the olden time in England forestry was a very important subject, and it is well to understand what a forest then was in a legal sense. It was not merely a woodland, but included also pastures and open grounds; it was a place for wild animals to live in, a hunting ground for the

privileged classes. All through the old times it was primarily a game preserve, or essentially, a hunting ground. Much of the literature of forestry may be found in the literature pertaining to horses and dogs, because of the relation of those two animals to hunting. There has been a change in the meaning of the term, and it has been well shown by Dr. Rothrock what people in this country have come to understand by the term, a woodland, kept either for commercial or other economic purposes, and not merely as a game preserve or pleasure ground. I think this matter of forestry we want to have brought prominently before the farmers of this State. If this is done it cannot fail to be productive of much good in covering with forests the waste places in our State where the original trees have been cut off and the ground is unsuited for profitable farming.

Some twelve years ago this State wisely chose to have a topographical survey made, and the surveyors, as they went over the ground, marked as carefully as they could the acres of woodland, and from this data a woodland map of the State was made, showing in colors on the topographical map those portions of the State covered by woodlands. A careful estimate was made of the area then classed as woodland, and it amounted to $38\frac{1}{2}$ per cent. which is more than one-third of the State. The area of woodland is increasing, for the simple reason that formerly lands had to be farmed that do not now pay. This was a relatively populous State in the early history of the country. Then most of the food had to be grown within twenty miles of where it was consumed. There were not the facilities for quick transportation we now have, and during those times the people of Connecticut had to depend upon their own soil for nearly everything. Then forests were cleared from poor and hilly land which does not now pay to cultivate. Much land that is now covered with mere brush or with new forest had then to be used for crops. This is no longer necessary, and the old use of hill farms needs be

changed. In these modern days when we compete in the production of food with the fertile prairies of the west, such land does not pay to farm in the old way. There is a large amount of that old land which will not now be used for farming, and which can be profitably turned into forests. As a matter of fact, many evidences of natural reforestation are to be seen actually going on. There are many places in this State where you can go through a forest and see the old lines of corn rows and potato hills on land that is now covered with trees that have come in naturally.

Forestry, unfortunately, has been misunderstood by many, perhaps most, of our people. There has always been in this State an interest in the growing of ornamental and shade trees; this has extensively been called forestry, but it is not forestry. There have been a large number of Connecticut people who have planted ornamental trees, and even some associations which have fostered the idea of tree planting, and have done good work in the planting of trees and shrubbery by the roadsides and about houses for ornamental purposes, and who have called that "forestry." Commendable as that work is, it is not forestry in the true sense, and I wish the term to be correctly understood by farmers. It is a good practice in its way, but it is not "forestry." Forestry is the conservation, care, and profitable use of the woodlands and forests. It is time that there was a change of sentiment in the country at large in regard to this care. The forest lands have been ruthlessly cut off in many parts of the country, and no effort made to reproduce trees to take the place of those that formerly grew there, and the country is poorer because of the neglect. That is the chief reason why lumber is so rapidly increasing in price. The practice has been to go into timbered districts and cut off the wood and then to desert the place. I have visited lands in several states that have been treated in just that way. Moreover, our lumbering has been done in a most wasteful way. In those states that have had

the most wonderful wealth of forest lands, they have paid the least attention to forestry as a science until comparatively recently. In our own State anybody who goes from New Haven to Hartford will see regions that were once covered with pine forests and now are comparatively naked. That is but a sample of what can be seen in many sections. It should not be so, and our farming population needs to be awakened to the fact that something should be done to re-cover those sections of our State with trees. Now we want to have it brought home to you, and brought home in every possible way, that forestry consists in preserving our woodlands for the owner's profit and for the public good. There should be some systematic effort to help the farmers to see that their woodlands may be made profitable pieces of ground and sources of income, as well as their tilled fields. There are certainly lands that can be made profitable as woodlands that are now nearly worthless. There are many kinds of trees that are indigenous to the soil of Connecticut, that may be profitable to raise and care for. In this State we now utilize for manufacturing purposes many kinds of woods which in former days were scarcely utilized at all. For instance, the white birch is now used for spools and other articles. It was once considered worthless, but now has been very extensively cut off and is even growing scarce. So, too, the dogwood, that beautiful tree, is becoming scarce in many parts of the State because of its high price for use in the manufacture of shuttles. Many other kinds of trees are becoming relatively scarce, some more than others, and what we want to do is to disseminate among the people of this State an understanding of how to manage woodlands, how to care for them, and how to harvest the crop of wood and timber to the best advantage, and without destroying the forest. We want the farmers to learn that there is a practical side to this subject, and that forestry proper is not a modern sentimental fad. I do not want to see the interest in tree culture stop with the efforts to set out shade

trees and ornamental trees. That must be continued, but it is not forestry. You might as well say that the cultivation of a little flower bed was agriculture.

More than a third of our state is already covered with woodland. This is in scattered patches, not large forests. Of the 25,000 farms in this state probably there is a piece of woodland on more than 24,000 of them, and probably 20,000 of those woodlands can be made to pay the owners more than they do now. We have started a school of forestry here at Yale University, but that is not going to reach the older farmers directly so largely as it will indirectly. Dr. Jenkins, now the Director of the Experiment Station, has planned a way to reach the farmers in this connection, and we are taking steps at the present time for experiment. It is hoped that the farmers will take advantage of it. There are many problems to solve which they cannot well do for themselves, but which the Experiment Station and Forestry School can aid in. We have already two pieces of ground, and they are being put into shape for practical experiment.

In 1876 I happened to be a member of the group of judges at the Centennial Exhibition at Philadelphia, and had to pass upon various forest products, among which were nuts. One of the things which surprised me greatly was the very important part that nuts play in the income of farmers and landed proprietors over much of the continent of Europe, more particularly in the central and southern countries. Walnuts, chestnuts, and filberts are grown in enormous quantities both for home use and for export. You can hardly find a grocery store in our cities that is not selling nuts from Europe. The walnut has there been cultivated from time immemorial, and is a source of much revenue. I made a collection of nuts for my own curiosity, of the various kinds coming from several countries, and in the study of the question met with some interesting facts. It was a revelation to me. Here nuts are luxuries; there both a luxury and a food. There is not time now to

go into detail. There are many different varieties of edible nuts which could be cultivated at a profit in this country if the subject was brought practically to the attention of our farmers. Our chestnuts are among the finest flavored in the world; but what farmer is there in the state that would think of planting chestnut trees for the purpose of raising a crop, the same as he would of other farm products? I want to see the time when the farmers shall understand the raising of chestnut trees as well as they now do apple trees. The Experiment Station is experimenting in this matter, and I am hopeful that the object lessons which are being brought out by that work will be of great benefit in the future. Dr. Britton is doing good work in these experiments. We hope to show that the farmers can do something in that line, and that they will try to turn our work to account.

I have said more than I intended when I rose, but out of the abundance of the heart the mouth speaketh. I have had this subject on my mind so long that I feel that I ought to be indulged a little in talking about it.

Mr. NETTLETON. I notice in all grocery stores bags of charcoal, and I find they come from Pennsylvania. We do not have any such product as that here, and I would like to ask Dr. Rothrock how that is produced.

Dr. ROTHROCK. I know very little about that, although I know that it is being put up in the way you suggest. The cheaper grades or waste wood are burnt and prepared in that way.

One thing which was suggested I would like to refer to you, and that is the relative difference between the natural growth of forest and a forest that had had proper care. We have been somewhat in the habit of believing that the natural growth of a forest is about the best that can be done. Now, there is no greater fallacy than that. There are plenty of acres of what you might say are cultivated forest lands in Germany which are known to yield 100,000 feet of lumber.

There is not an acre of that sort of land on the Atlantic coast to-day.

Now, the matter of cultivating chestnuts has been referred to. We have had a remarkable illustration of what can be done in that line. Down in the neighborhood of Harrisburg a gentleman by the name of Engle went out into the hillsides and took up some rough, rocky ground and began raising a crop. He cut off the chestnut trees and allowed them to sprout up, and then at first grafted chestnuts into them. There are only a few acres of it, but he has had, considering the short time, remarkable success. Unfortunately the last year the whole thing was killed by a forest fire. Now, you go into southern Europe, into Germany, and you will be surprised to find how largely the chestnut enters into the diet of the people. We call to mind the statement of Malthus and his prediction relative to the over-population of the world, and that it could not support its population. That prediction was made years ago, but even now, though the population has largely increased, we are only on the edge of our resources that can be used for the support of the people. We have been living on the best ground and have been dependent to a large extent on the spontaneous bounty of nature. By the close care and cultivation that is given in some populous countries there are men who are getting more income, I should say, from half an acre of ground, or that are getting a bigger financial return, than a larger number of the farmers in our State get from their farms, and are doing it at almost no expense. There is a market for all the good chestnuts that can be raised. There are dealers in New York who are glad to get them. There is a dealer in New York who takes almost all of these chestnuts which this man I referred to has for sale. So far as I am aware, you might just as well raise them here.

A MEMBER. I would like to ask the doctor a question. He said Mr. Engle had his trees destroyed by a fire. It seems

to me that that is just the trouble. It is so discouraging I do not think very many will take up the business. I should judge that that would apply also to setting out forests. There would be great danger from fire, and not much encouragement for anybody to go into it.

Dr. ROTHROCK. There are a good many in Pennsylvania who are taking it up on a very extensive scale. We have many lumbermen that have got young forests that they are protecting, ten, fifteen, and twenty years old, and they are protecting it by fire breaks running around the tracts so that the fire cannot spread from one tract to another. We propose to have a force of forest guards and we are going to make an attempt on the line of what I believe the United States has done. When you think of it in this country, for the past one hundred years, many men have believed that they had a divine right to burn forests, and it is hardly ever that men have been punished for it. Under such circumstances what can you expect? The fact is such men have got to be apprehended and tried, and then the evil will stop; that is all that is needed. They have got to be given to understand that they have no such divine right. They have got to be made to feel the hand of the law upon them. There has been too much of that sort of thing, too much for the public good. I am myself \$5,000 poorer because of a forest fire on my own lands. Until the public sentiment is aroused so that it will not stand that sort of thing any longer, it is difficult to abate it. But that is a part of my work. I propose to take every opportunity to arouse public sentiment. In this case where my property was burned I went to the county commissioners and told them that I paid taxes for protection, and requested them to bring the culprit to justice, but they told me that they could not find the man. I went around the lumber camps and paid detectives, and did it myself because our county officers do not wish to incur the hostility of these pests of our country. I have had some interesting experiences in this line, and pro-

pose to do my utmost to see that this lawless element in the mountain regions of Pennsylvania and among our forests is crushed out.

Mr. HINMAN. There are some times when a forest seems to take from the ground more than it returns, or, at any rate, certain trees do. I have a meadow that has been in my family for a great many years and in that meadow there was a spring. When I was a little boy my uncle owned the meadow, and I used to go up there and sit around that spring. We used to take cucumbers and throw them into the water, it was so clear and cold, and it was an elegant place to eat dinner under the shade of that tree by that spring. In process of time, before I bought the farm, there came up a maple tree. It made elegant shade. It grew and grew, and when it got about so big it took every bit of water. Its roots absorbed it, diverted it so that the tree spoiled that valuable spring. I was obliged to cut the tree down to get my spring back, because I wanted it for my cattle and could only have it by doing away with the tree.

Secretary GOLD. Did you get your spring back?

Mr. HINMAN. I did. The spring is there to-day. That tree, growing larger as it did, with its roots spread out all over the ground, took that water right up and the whole spring was gone. In the summer time, when the leaves were on the trees, that was particularly so. There was an instance where one single tree spoiled a living spring for years. When I cut the tree down, the spring came back, and is there to-day.

The PRESIDENT. Now, let me make a little inquiry in regard to something on my own farm, a farm which I bought some forty years ago. There was an inland spring of water on it; no visible outlet or no visible inlet to it; only from the bottom of this little pond there seemed to be feeding springs. I never found them and never saw them. Right near by were four very large oak trees which cast their shade over it. It was just about the size of an ordinary farmer's garden. There

was always water there, water there for my stock summer and winter without fail, but somehow or other the lightning seemed to have some spite against those trees and struck nearly every one of them in the course of six years. I don't know why they should have been there for a century and not been struck, but all at once they were destroyed and died. In the same locality not far from the stumps there sprung up other little shrubs and bushes like, and for a time the water there nearly dried up. It dried up almost wholly for several summers, so that, in a dry season especially, the cattle could not drink there. There would be a little in the bottom, but no real supply of water. Those trees have grown and they are fine oak trees. This last season there has been plenty of water, and it has been a very dry season. The water has returned and the trees have grown. I cannot understand it. I wish some of you would explain it. That doesn't correspond with Mr. Hinman's experience.

Secretary GOLD. I want to introduce to the audience Professor Toumey of the School of Forestry in Yale University. We will be glad to have him come forward and either explain some of the work that he proposes to do, or you can ask him questions.

Professor TOUMEY. Mr. President, ladies and gentlemen: I am very sorry that Professor Graves, who is at the head of the School of Forestry, was called away to Washington to attend a meeting of the American Forestry Association, and that he is not here to-day to speak to you at some length regarding the new School of Forestry at Yale. However, I can say a few things regarding the scope of the work that we propose to do. Professor Brewer has told you something of the conception that a great many people have regarding forestry. That conception has arisen from various so-called forestry associations throughout the country, the members of which have received the idea that forestry consists in planting shade trees and in planting trees for decorative purposes. Now,

forestry, if anything, is a business proposition. I think I can say regarding the School of Forestry, that the purpose of the school is to make it a business matter, for if forestry cannot be carried on in a business way we have no right to carry it on at all. We know forestry can be carried on in a business-like way. Now, the work of the School of Forestry consists not simply in recitation, it is not simply book work, but a large part of it is field work, and the work which we are doing now in the school consists in some measure in getting out into the woods and making measurements and in doing other field work of similar nature, as well as in giving classroom instruction in the management of forests. Later in the course much of the work will be carried into larger woodlands where we can have practical work in the managing of forests and where such management can be shown to advantage to the students. This briefly is the work which we propose to do and which we have started out to do in this new school of forestry. The time is ripe, as you have already been told, for such a school. The forestry interests in the United States are excelled in value by nothing but agriculture. It was estimated only a few years ago that the annual value of the wood cut or the annual consumption of wood produced in this country for a single year is a billion dollars. Now, we as Americans cannot afford to sacrifice a natural product which is bringing in this vast amount annually. We have got to keep it in condition so that it will bring us an annual income. We certainly cannot afford to see it destroyed. This great interest must be maintained, but it can only be done through forest conservation and correct management. The purpose of the school is to so train young men that they may become expert foresters, that they can go out and assist in this work. Dr. Rothrock has already spoken of the reservations that have been established in Pennsylvania. Other states have forest reservations. The forest reservations, both State and national, must be put upon a business basis, they

must be handled the same as other property, so there is a need for young men, a need for men to be trained so that they may know how to organize and how to properly manage our forest interests. After the work of educating foresters is well in hand and the great advantage of properly conducting our forests becomes apparent in this country, the farming element will naturally follow and apply more conservative methods to the management of their own forest lands. In connection with the Yale school we propose to do forest planting. We propose next spring to start a plantation of forest trees on land now under our control not far from this city. We purpose to have a nursery and establish seed beds where various kinds of trees may be grown for demonstration purposes. It is the aim of the work to make it as practical as we can. We know we cannot apply at the present development of forestry in this country complicated methods of forest management. The present demand of the country will not permit it. Just as soon as we begin to give some consideration to the regeneration of forests on our lands, then there will begin the practice of forestry. When the public appreciate this fact, then they will begin to look out for the future crop, they will begin the application of correct methods. Our aim is to have our methods such as to meet the economic demands of the country.

Without saying anything further on this subject directly concerning the school, I want to make a few remarks regarding the statement made by Dr. Rothrock relative to the indirect value of forests. He told you forests were not only valuable for the direct value of the wood itself, but that they were valuable indirectly on account of their value in the conservation of moisture. We do not claim that they increase the rainfall, but we know that they conserve the rainfall, and that the greater the area of forest land is, the better, from the standpoint of humidity, is the agricultural land in the vicinity. I am very much interested in the protective side of forestry,

especially regarding the effect of forests upon stream flow, upon the conservation of moisture. The last year that I was in the employ of the Division of Forestry I spent considerable time in the San Bernardino Mountains in Southern California. At the base of these mountains land is worth from \$500 to \$1,000 per acre where water can be gotten upon it. If water is not brought upon this land, it is not worth a snap of the finger. The land is not valuable, it is the water that is valuable. On the watershed of these mountains, in coöperation with a private company, we have determined that the indirect value of the forest is very great. The precipitation has been carefully investigated, and every stream upon the area studied has been accurately gauged, the water has been measured that has run from the watershed, so that we have been able to compare the precipitation and the run-off on areas that are forest covered and areas that are denuded of their forest growth. In a number of instances we have been able to show that at the time of the heavy rains, when the streams rise to great height on the denuded watershed, they immediately recede and in a short time reach their normal flow. On the watershed that is covered with timber the flood water rises to a given height, but instead of receding as rapidly as in the other case it gradually recedes, *i. e.*, it takes a longer time for the water to run off. In other words, the run-off is much more gradual from the forest-covered area, showing conclusively the greater value of the forest-covered area to hold or conserve the water.

A MEMBER. I would like to ask if it has been determined whether in the actual run of water there is any difference in the amount of run-off between the naked and tree-covered area throughout a year?

Professor TOUMEY. Our data on this matter is not entirely worked up, but it appears that the annual run-off is more on the wooded areas. We do not comprehend the enormous amount of water that is taken from the denuded areas

by evaporation. I recall a specific illustration in the San Bernardino Mountains. Before the mountains were lumbered a stream near the summit of the range was perennial in its flow. In recent years the middle area through which the stream runs has been lumbered and burned. At present the stream keeps up its flow until it reaches the denuded and burned area, when it entirely disappears, but as soon as the stream reaches the wooded area again it reappears.

Dr. ROTHROCK. That shows the enormous amount of evaporation which takes place. When I was in Arizona, which, of course, is an exceedingly dry country, I saw some illustration of that. It shows the wonderful power of the sun to take up or absorb the precipitation there, which is principally in the month of June.

Mr. HINMAN. Mr. Hale is not here to combat this theory, but he told us yesterday if we wanted to hold the moisture in our orchards we must not set too many trees. And that if the trees were set so that they covered the ground too closely, they absorbed the moisture, and that the crop was ruined. He said that in a dry season it was better to have fewer trees, because the evaporation from the soil was nothing like as great as the evaporation that the trees threw off through being set closer together.

Professor TOUMEY. I think if you were to put out your orchards and not attempt to cultivate them at all you would find that your trees would die from lack of moisture. In your orchards you conserve the moisture in the soil by cultivation; in the forest the soil moisture is conserved by the mulch. If trees are too far apart no mulch will be produced. I admit if you produce a soil mulch by cultivation, the greater the number of trees upon a given area, the greater will be the loss of moisture through transpiration.

Secretary GOLD. I must beg leave to cut this interesting discussion off at this moment that I may introduce to you a man whom you will all be glad to hear, Professor Ballou of

the Forestry School, recently established by the Connecticut State Agricultural College. I propose to give him five minutes to say something of the scope and purpose of his department in forest work.

Professor BALLOU. Ladies and gentlemen: This is rather unexpected. You have listened to some gentlemen who have told you some facts, gathered by their experience, which have been certainly very interesting and instructive. I have nothing of fact in my own experience to give you, practically nothing, at least nothing that I care to present to this audience, but, as Mr. Gold has informed you, he wanted me to tell something of what we propose to do. This is our plan: The trustees of our college have planned to give a course in forestry broader than we have ever given before, and broader than most of our agricultural land grant colleges have been in the habit of giving. Forestry has been taught generally, or a so-called forestry, but it has been a sort of a branch of landscape gardening in which the characters of different trees were taught and their shape and use, etc., and it has been allowed to go at that.

We have some land that is adapted to this purpose. Some of it is worthless now. It bears a few little clumps of bushes, a few straggling specimens of trees, and quite a quantity of smooth round stones that are of no use. We have somewhere in the vicinity of thirty or thirty-five acres of good timber, oak and chestnut largely. Now we propose to plant that worthless land with a variety of trees, using those kinds which have proven themselves in the State to be of some value for timber, in one form and another, and other kinds that may go with them. We shall try to find out what timbers that are not in much demand now can be grown. I am not going to describe different methods, but we are going to try to see whether the farmer can afford to plant lands with trees for the sake of his woodland or for the sake of getting out what timber he needs for repairs, for posts and rails, and such things. We are going to take measurements,

and find out how rapidly different kinds of trees have grown. Of course our field is limited, and it covers a very small area. Our measurements will not be of as much value as those taken by the department at Washington, but they will be of local value. We shall take the matter that we have in hand, and work it over. Our ideas naturally will be taken from the instruction of those who have had more experience than ourselves. We have picked out one piece of plain, from the appearance of which and from the character of the soil would naturally be good white pine land, some thirty acres, and it is proposed to put upon a portion of this some white pine seedlings. There is one little bunch of yellow pine which is of little value; there is some chestnut and oak and hickory on it. We propose to find out for ourselves in such a way, if possible, that our young men who probably never would have the advantages offered by the Yale School of Forestry can find out some facts which will be of value to them upon their farms, as to how much expense and how much care and labor they can put into the preparation of land devoted to this purpose, and of the care of the same. I think we shall be able to give them some idea of what these things cost. There is one thing that a great many farmers recognize, and that is the fact that time with a farmer is not always money. I mean by that that there are seasons of the year that the average farmer can spend in almost any way, and not have to charge it up against his cash account. That may not be true on every farm, but I know it is on some. And on such, if they can be made to take such seasons of the year to do this sort of work, it is bound to result in advantage. It remains for us to see whether it can be done. We are somewhat in doubt yet as to what we can do at the college. We have two terms a year in this course, the first term beginning after our Christmas recess. We are in hopes of giving the youth of Connecticut who come to the school some practical ideas as to the management and care of forest lands which will be of benefit and use in after life upon their

farms. I presume the plan of our work will appear to some extent in our catalogue.

Mr. HOYT. This is a question that I am interested in. I have had some experience in growing trees and knowing the habits of trees, and I am interested to know that there are some steps being taken to promote forestry in this State, but I would like to give those who are interested in this movement and those who are starting in it a few points in relation to seedling trees, and those which are best adapted for forest growth. As Professor Brewer stated this morning, it is over twenty years ago since this board first commenced to talk upon this question. This question of forestry has been touched upon and discussed at various times at these meetings, but, what has been done in this State by the farmers? I cannot understand that there has been anything done. The profits from it or avails from it are so far in the distant future that the farmers will not as a class take hold of this work. My own opinion is that it is a work that ought to be and must be done by the State. I feel that there should be a commissioner of forestry for the State of Connecticut the same as we have our commissioners for various things. We have our fish commissioner, and dairy commissioner, and cattle commissioner, etc. The farmers are commencing to inquire, or at least some of them are, as to how they shall get these things, or how they shall start them. It has been said here that this must be carried on in a businesslike way. Of course it must be done in a business manner, but the question is, how are the farmers going to get this information that is necessary in order to enable them to start on these lines that are suggested? There must be some effort put forth to educate the farmers up to this work, and to give them proper information. I believe the State could well afford to assist in the work, but as Yale University has taken hold of it I trust that the information that is required will be forthcoming. A few years ago I saw a statement that a black walnut tree had

been sold for, I think it was, \$75. The lumber in that black walnut tree brought \$75. The black walnut lumber of this country is fast passing away, it is lumber that will be wanted always, and he who puts out a black walnut tree upon his land and cultivates it for twenty-five or thirty years, while he may receive nothing from his labors during that time from that land, yet, at the end, he will have a fortune if he puts out enough of them.

A VOICE. Hadn't he better get his life insured? Wouldn't that pay better?

Mr. HOYT. Whether he lives to reap the benefit of it, or whether some one else gets it, is in a sense immaterial. We don't live in this world entirely for ourselves. We live in this world, certainly to some extent, for those who are to come after us, as well as for ourselves, and anybody who puts out black walnut trees, or the European larch, or the white pine will have trees that will be sure to bring a heavy revenue in thirty or forty years.

In planting trees for forest, in my opinion, it is advisable, at least from my observation in growing them, to put out a good variety; that is to say, I would not put out pine, oak, or black walnut alone, but I would begin the forest with pine and other valuable timber trees of various kinds interspersed among them. They will grow better and they will grow faster, and they will be more profitable if they are grown in that way. We have on our place trees that I set out, perhaps forty years ago. I put out a tulip in the center of a group and surrounded it with white pine and Norway spruce, and those trees have all been trying to see which would get up the fastest, and that old tulip planted in the center of the group is now a tree seventy-five feet high, and stands there above the rest. There is a white pine two feet in diameter there. I measured that white pine, and it is two feet and four inches.

I have noticed in the nursery where we grow mixed trees

together that we can grow handsomer trees and more of them, and trees that will be finer in shape. I do not know why it is, but that is the result of my observations. It seems to be better to do that than where all of a kind are grown together. Where they are mixed they will grow right up straight, and true and handsome.

The PRESIDENT. Do you think that elm trees surrounded by maples are more exempt from the ravages of bugs or from the attacks of insects that destroy them?

Mr. HOYT. Yes, sir; I do.

Right here there is one other thing I want to say in relation to setting out trees. It doesn't seem to me wise to attempt to raise them from the seed. I believe in mixing the trees together, but I do not think it advisable to attempt to raise them from seed. There is a gentleman here from the college, and, as I understood his remark, he said that they were planting seed. It is a long process to raise trees from the seed. It is a wonderfully intricate process and delicate work to raise these seedlings. They can be bought in Europe for seventy-five cents a thousand, as labor is very cheap there. I do not know but what the college boys can do it, but by buying the seedlings which are advanced, you save just so much time. I think the black walnut can be bought for about \$1.50 a thousand. In New York State Forestry Division they are raising these seedlings. They have set out more than a million. They are feeble little things, and it will cost New York State more to raise those seedlings than it would to have bought the same varieties which have been started where the conditions were better. If you gentlemen are going to start out in forestry business you had better get some seedlings to start out with, and you will be four or five years ahead.

Secretary GOLD. Mr. Hoyt's reference to that recalls to my mind an incident. I advert to one of those incidents or accidents that sometimes happen to seedlings imported from Europe. I think he will recollect a lot of Scotch larch

that were imported. He had some ten thousand, I think, and I had a thousand or two which I set out, but the experiment was an absolutely total failure. They failed to grow in Mr. Hoyt's nursery rows just as they did in my fields, so that my experience has shown that it is not altogether lovely importing these seedlings. The trouble is, they sometimes come in bad shape. I presume that was the case in this instance. That is one of the disappointments that I have met with in my efforts in forest planting.

Mr. HOYT. I think that difficulty comes from bad packing; if they are put up properly they will come in good order; but it is a fact that thousands of them are destroyed by bad packing.

A MEMBER. What is the proper season for transplanting white pine?

Mr. HOYT. The spring of the year.

The PRESIDENT. It seems to me that this discussion is not only interesting, but intensely instructive. There are some classes of wood of which even now the supply is unequal to the demand. The railroad men are very anxious to get all the railroad ties they can all over the country, and their steam saw mills are being moved into every piece of chestnut timber that is left. There is one thing I want to add right on that point. These chestnut stumps that are left and the sprouts that grow up from them, are they good for anything?

Mr. HOYT. All the chestnut that we have got now were started in that way.

The PRESIDENT. I have noticed that while a good many of them looked well on the outside they are defective. They will grow quickly. They will bear chestnuts in a few years. I have got quite a large field of just that kind of trees now, but I have discovered that wherever I cut one I am apt to find it is defective; there is sometimes a hole in it as big as a man's arm. To look at them from the outside they are all right.

Right here I will put in another suggestion. When Mr. Hale was speaking about certain rocky sections where he was clearing out the brush and getting the land ready to plant with apple trees. I have discovered that you have an apple tree in a place where you have cut off wood, where before you would find nothing but a miserable looking apple tree sprout, when you cut the timber then it will grow vigorously; another thing, it will bear vigorously, and bear good apples. That's right along in line with what Mr. Hale said. Another thing, you will never see any San José scale or any kind of insects there. Every apple will be clean and smooth and bright. It is a question with me whether there isn't something for us to utilize, whether we cannot put apple trees on these denuded forest lands, and secure some nice fruit.

Mr. HOYT. What is worth doing at all is worth doing well. You can get good fruit anywhere if you put the trees out and take care of them. You have got to take care of anything that you put out if you expect to get good results.

Secretary GOLD. My experience in tree planting began about seventy-five years ago, and I have continued it from that time to the present with various degrees of success. This theory of our president's was very attractive to me. The idea that our virgin land had been despoiled of its fertility I did not believe. I had an idea that if an orchard was set out in that way that insects would not be encouraged. That what was wanted was to bring back fruit culture here in Connecticut to the same profusion which we were told our fathers and grandfathers enjoyed before us. About sixty years ago I tried this experiment: I took an acre of ground of good strong forest growth, and as good as I had anywhere, cut it over clean, enclosed it with a strong fence to keep out all animals, and proceeded to plant it with a selection of fruit trees, plums, apples, and other trees. I hid them away in the forest where the insects could not get at them, as I supposed, and I fondly

hoped that I should have some nice, well-developed fruit. I kept cutting all the sprouts as they appeared from the native timber in order to kill them as my trees proceeded in growth. I planted my trees. The first difficulty arose when the woodchucks visited my clearing, and used the bark of those trees to sharpen their teeth upon, or to clean their claws on, especially in the early season. We don't know exactly how a woodchuck does that, but he has a way of doing something of that kind that is pretty bad. Next, the rabbits invaded the clearing, and I found on the trees that stood at all that the fruit had about as many stings of the codling moth as those planted elsewhere, and so I concluded to let the trees take their course. I removed the fence, and let the chestnuts sprout up as they would. My experience with other tree planting has not all been like that, or I should not be here to-day.

Convention adjourned to 2 P. M.

AFTERNOON SESSION.

December 13, 1900.

Convention called to order at 2 P. M., Vice-President Seeley in the chair.

The PRESIDENT. The question-box is now to be opened.

Secretary GOLD. I find quite a good deal of material. The first question is:

Q. "Does the English sparrow help to spread bark lice and scale insect pests; if so, how and when?"

Secretary GOLD. Well, of all the things which are rightly laid to the charge of the English sparrow, I do not think it should be charged with this work. If any one thinks differently I should be glad to hear of it.

A MEMBER. You take an English sparrow after a heavy rain and look on its feet and you will find lice. After

there has been a heavy snow in the winter time or one of those heavy ice storms separating the "outer bark from the inner on trees and shrubs where the sparrows congregate, if you watch them then and look on their feet you will find oyster shell scale. I know that you can find them, and that they can carry them from one place to another. You can find them if you look where I have. That is one thing that makes me say I want to see the boys shoot them.

Q. "The San José scale has appeared in several peach and plum orchards in Milford; last season all the trees infested that could be found in two large orchards were taken out and burned, but this season there were more trees infested than there were last. What ought to be done?"

Professor BRITTON. In regard to the San José scale, I would like to say a few words. We have been talking about it for the past five years, ever since it was first discovered in this State. Some have made statements that altogether too much has been said about it, and that too much has been written about it, that it was a big scare, that it would not amount to anything. But, in spite of all this, a great many persons in the State have yet to hear and learn about this scale. The fact is that it is well distributed all over the State; some of the leading cities like New Haven, Hartford, and Bridgeport are thoroughly infested with it. I had a letter the other day from Hartford showing that the trees and even shrubs in that vicinity were infested with the scale, that it was spreading rapidly and covering everything. The case has seemed almost hopeless. I think, however, there is a remedy sufficiently efficacious to hold this pest in check. The best thing to do is to spray it with kerosene and water, using one of those new pumps which mix the two under pressure. We can spray it at this time of the year, using fifteen per cent. of kerosene to eighty-five per cent. of water. That is what I should advise if I found some infested trees in my orchard. I should give them another spraying before the buds open in

the spring, using twenty-five per cent. kerosene. The second spraying ought to kill nearly all the scale. We cannot expect to exterminate them. If it can be checked in this way I should then recommend giving one spraying every year to keep them in control. This scale is with us to stay. We have got to fight it every year the same as we fight the potato beetle. We hope something else may control it in time, but we cannot afford to sit still and wait for that something to come along, because our trees will be covered with it, and ruined in the meantime.

In this State, as you know, there is no legislation regarding insects, while in about half of the other states there is legislation. They provide for the inspection of nurseries and the inspection of orchards, and try to control the insects, so that it is impossible for any nursery stock to be shipped unless it bears a certificate of inspection showing that no San José scale was found in that particular nursery. Now, the Experiment Station has been inspecting nurseries, and giving these certificates for the purpose of enabling our Connecticut nurserymen to ship stock into other states. We have been out and looked over orchards, and advised treatment. While we know that treatment has been applied in a good many cases, we know it has not in others. We have no authority, of course, behind us to make any one kill the scale; so that, aside from helping the nurserymen by way of certificates, our action has not protected any one. Several nurseries have been inspected and found to be infested with the scale. Of course a certificate in these cases was not given. A second inspection has never been called for, and we suppose that those nurseries have been distributing the scale all around inside of the State ever since. Of course they could not ship it out without a certificate. Now, the question is, what is to be done? Some say we do not want legislation; that the State, being badly infested as it is, cannot hope to clean it out. Of course we cannot exterminate it, but I understand that those states

which have enacted laws regarding the question have not repealed those laws; they are still in force, and they have been amended as needed from time to time. Those states still have laws, and consider them a good thing. It seems to me that one of the best effects of legislation, if it is possible for a system of inspection of orchards to be instituted as well as of nurseries throughout the State, that a good many people will learn to know this insect that never will know it in any other way. If some competent person goes around and tells them about it and calls their attention to it, it will help to stamp it out in that way. When he finds it he can show it to them and tell them what it is, and in that way save a great deal of injury to our fruit. A thousand dollars properly spent would save ten thousand dollars in all probability five years later. The other day one of the leading citizens of New Haven, and a man connected with the university, wished to send a few shrubs to a friend in New Jersey. The Adams Express Company would not accept them because he had no certificate of inspection upon them. I had to go and make an inspection and give him a certificate, even though he was merely giving away those shrubs to a friend of his. That shows how strict they are in some states, while Connecticut has done practically nothing.

Another remedy that has been tried is fumigation. That has been practiced in many cases and in many states it is advised, but I do not think it is practical unless on nursery stock, spraying being much cheaper and quite effective. Not as effective as fumigation, perhaps, but it is so much cheaper. You can well afford to give several sprayings instead of one fumigation.

Mr. WOODRUFF. I want to call the attention of this board to another matter. Possibly the subject of the pea louse which is now infesting all of the pea crops of this State and other states has been brought up here. I do not know as to that, but if not it seems to me it is a subject which should be

discussed somewhat. I should be very glad to hear what the scientific men have to say on that subject, or any others who have any remedy for that great pest at the present time. It certainly is creating more havoc, probably, and is causing the loss of more dollars to-day than any one of the newer pests which we have to fight; it is one which is worthy of discussion, and I should be glad to learn of any remedy which is effective to handle this little fellow. It destroys the pea vine, and, so far as I know, it has been lively enough to keep ahead of the farmers and the scientific experiment station up to date.

It works on the leaf. Paris green does not take hold of it. I wish that one of the gentlemen from the experiment station would enlighten us in regard to this louse.

Professor BRITTON. This pea louse has done a lot of damage throughout the eastern states during the past two seasons. It extracts the juice from the pea vine. It is found upon the upper and lower surfaces of the leaves, and on the stems. Sometimes the plant will be literally covered from top to bottom, and it keeps pumping out the sap until the plant dies. Now, we might as well say at the outset that there is no cheap way of getting rid of this louse — fighting it in any way is expensive. It does not appear, however, upon the pea vines until about the first of June, when all of the early peas are picked, so that it is possible now in spite of it to get a crop of early peas. Down in Maryland and Delaware, in the large canning districts where they grow peas by the hundred acres and sometimes by the thousand acres, this insect has caused a great amount of injury, and they have tried all sorts of remedies to get rid of it. We have tried various things at the station. You can kill the pest if you can get whale oil soap and water to come in contact with it. Spraying the pea vines is a very expensive operation in a field of peas, and it is hard to hit them because some are on the under side of the leaf, and hence any operation of that kind is not so very effective. I think the best way known and the most up-to-date

way is to go along and brush them off every two rows, thrashing the plants slightly so that the insect will fall off, and then go through with a horse cultivator, and you cover or crush nearly all that fell off. If this is done about once a week you can get a fair crop of peas even from your late vines.

Governor HOARD. What would you do with peas sown broadcast?

Professor BRITTON. Our gardeners do not grow them that way. In such a case I do not think you could get at them in any way except by spraying.

Governor HOARD. Will planting them early help them?

Professor BRITTON. Yes, sir. In this latitude, at least, they do not appear on the vines until about the first of June. Men who have made a careful study of this insect find it lives through the winter on clover and plants of the clover family.

Governor HOARD. Does it lay its eggs on the clover plants?

Professor BRITTON. No, it is one of those things which brings forth its young alive. It apparently remains dormant through the coldest weather. I brought in some clover the other day and I found some around the base of the stem. They are not very active at first, but begin to warm up and get to work in a few days.

Mr. WOODRUFF. This remedy suggested by Professor Britton, unfortunately, is not practical. If you knock them off it will not kill the lice in sufficient numbers so as to help your pea crop much of any. Our firm spent some considerable money investigating. We corresponded with a number of authorities on this subject with whom we could get into communication, and, as a matter of fact, none of these methods are practical and up to date. It is true that perhaps we can succeed in getting a full crop of very early peas, that is, the very earliest or extra early peas. They have been able for the past two seasons to come through with a partial crop. Such

peas as the American Wonder, Excelsior, and other early varieties will not go through except in isolated cases. We found on examination that more than seventy-five per cent. of the market gardeners who planted peas last season lost their crop because of this pest. It is really the most serious pest that has attacked the market gardeners since the potato bug came upon the platform, and it is a pest which has staggered the professors in their efforts to suppress it. Nobody has yet been able to find an effective remedy. I hope that somebody will devise a plan whereby we can save our peas.

A representative of our firm visited the pea-growing section of northern New York State and Canada. We heard that they were so far free from it, but the moment that our representative got upon their fields he said, "What is the matter with these peas?" They said, "They have the blight. We cannot tell what is the matter with them, but they seem to have a kind of blight." He said at once, "I can tell you what is the matter; those peas have the pea louse." And when he shook the vines they dropped down in very large numbers. Now this thing is something which has got to have the attention of everybody who is interested in the culture of peas. I fear in a year or so it will attack them in such quantities that it will clean the crops right out. We cannot interest ourselves too much in this subject. I know of a way to get rid of the louse, but at the same time we must get rid of the peas. The latest advice that we have received on the subject is to plow them under as quick as we see the louse on the vines. But that is not a very practical plan or very profitable either. There is no use in trying to brush them off the vines, they get back again. We tried this knocking-off arrangement, but the lice got back faster than we could brush them off.

Q. "Is the Willard plum any good? Would it be best, and how and when could I graft trees two inches in diameter

of this variety successfully? What varieties would you advise me to use as grafts when the trees are Willards?"

Mr. BUTLER. I would say, Mr. Secretary, if I had the Willard plum I would take them out and put others in their places. It is too large to graft upon profitably, and it is a tree which is short lived, and you can grow better plums by planting new trees.

Q. "Is not the New England market practically reserved for New England peach growers?"

Secretary GOLD. They have only reserved it by putting on the market a better article than they can raise elsewhere. We believe that we can do that part of it as well, if not better, than anybody else. Whether we can do it continuously, and hold it against all competitors remains for such men as Mr. Hale and Mr. Platt and others to prove. They are scattered all over the State, and they are trying to prove it, and it seems as though they had accomplished it pretty nearly, because the Connecticut peach market now belongs to us, and not to outside people.

Q. "Is the growing of cantaloupe melons successful and profitable in the big peach orchards in the North?"

Mr. BARNES. I think it is a question how successful they will be in among the peach trees; they have done very well in field culture. They did well this year, and I think there will be a better crop next year, and better money in them than there has been for the last few years.

Q. "Are rhubarb plants intended for forcing benefited by freezing before being placed in the cellar or green house?"

Mr. WOODRUFF. They will not do anything before they are frozen. They have to lie on the top of the ground and freeze before they will start at all.

Q. "Is the hired help problem on the farm any easier to solve now than it was ten or twelve years ago?"

Secretary GOLD. I do not know as we shall be able to

solve it even after that experience; we are all the time learning something new about it.

Q. "What are the habits of the Belgian hare; are they to be desired, and is there any profit for the farmer in raising them?"

Secretary GOLD. The reports that I have received of the Belgian hare show that it is enormously prolific, and will eat anything and everything that it can get hold of. It is a very fair substitute for a game or chicken dinner. We are warned, however, against giving them the free run of our farms. The first thing to do when you want a hare is to catch your hare, and that is not always easy. There is danger of their becoming destructive to fruit and crops generally, so we are warned against this omnivorous quadruped; it should not be allowed to run loose in our fields. You must make a pen and put it in, that is absolutely proof below as well as above, as it digs down and out as well as going over most ordinary enclosures.

Q. "How can the apple grower best protect his fruit from the warm weather that comes on after picking?"

Secretary GOLD. We cannot entirely. My practice is if possible to put them in the barn, open the doors at night, and keep them closed as much as possible in the day time, and in that way try to avoid extreme changes of air or accumulation of heat. When we pick our apples in those hot days of autumn and store them away we find them very much affected by the heat that they carry with them to the barn.

Q. "Will turnips sown in a peach orchard in August, and allowed to remain, make a good cover crop?"

Secretary GOLD. As to clover plants, they make a good cover crop as they gather nitrogen from the air and supply it to the plant. As a rule that habit of drawing nitrogen from the air is confined to that one family of plants. Turnips may gather it from the soil, and hold it during winter.

Almost any vegetation that the winter will not kill is better than none at all.

Q. "Who has had the San José scale on his trees, and has gotten entirely rid of them?"

Professor BRITTON. I don't believe anybody has unless he has destroyed the trees.

Q. "Who has fruited persimmons or paw paws in Connecticut?"

Mr. PLATT. I don't believe the persimmons ever could be made to grow generally here. I have seen them on trees in the shore line towns; a very few there. I had a tree which bore about twenty.

Professor BRITTON. In regard to the persimmons: down at Lighthouse Point, below New Haven, there are a few native persimmon trees. That is the only locality where it grows well that I know of. This last season they bore a few. Some of the men who live around there have told me that they never bore any fruit, but a gentleman from Southington, who was down there last spring, found one tree which bore the familiar flower, and he went down this fall and gathered a dozen or so of small fruit.

Q. "What red winter apples are gaining in favor?"

Mr. PLATT. Any of the red apples which look well, so far as I can see. There are two or three particularly. Most apples of a fine smooth red color are popular,—those that look and are shaped like the Baldwin, and are a good fair size.

Q. "Who has grown the Stark apple, and what has been the experience with it?"

Mr. HINMAN. I have. It looks well, and they say it is a good winter apple. It does not look like a first class dessert apple to eat out of hand.

Mr. PLATT. The tree is a fine grower, and the apple is a good looking apple. I do not believe, though, it is of first quality. I do not think it is as good as the Baldwin.

Mr. HINMAN. I should hate to say it was not as good as the Baldwin. I think it is better than the ordinary Baldwin, it is a little larger and fairer. The tree is a very fair grower. It is just a little bit tough.

Q. "Where on the country roads does the farmer want trolley roads to go; in the middle or on the side of the street?"

Mr. POTTER. There is a difference of opinion among farmers about that. Some would have them on the side of the road, and some in the middle. A day or two ago I was over in Providence, and I saw one particular line running to East Providence, which was a double track, and one track ran down one side of the road, and the other track ran up on the other side. Now, it seemed to me that that was very objectionable. There was no safety anywhere for a team, and the only space which could be used for the road was in the center with the trolley tracks on both sides. It seemed to me that that was very objectionable.

The PRESIDENT. I have no need to introduce to you the Hon. William D. Hoard. He will introduce himself, as he has already done. We have already been delighted by one lecture from him, and I will ask him to go right forward with the business he has been set to do this afternoon.

SOME FACTS AND FIGURES CONCERNING COWS.

HON. WM. D. HOARD, FORT ATKINSON, WISCONSIN.

Mr. President, ladies and gentlemen: I had proposed to speak upon the topic which is named in your program, "What Constitutes a Dairy Farm," but the more I thought about it, the more I thought it was bigger than I was. It is a very important proposition. I have been trying for a number of years to work it out to my own satisfaction, but I am not at all satisfied with what Hoard has done in that line, and I really do not believe it is a good thing for me to come here and

start any dissatisfaction with you, and while I can see some progress, still I am going to take up another subject, "Some Facts and Figures Concerning Cows." Before coming to the direct discussion of that subject, however, I will say a few words on the other question. One of the important particulars in the constitution of the dairy farm is to so arrange it, and manage it that it shall be a very productive food producer for cows. Therefore, one of the first essentials with it is that it shall be located on productive soil. The longer I handle cows the more am I convinced that about the most unsatisfactory and costly feed that I can produce for my cows is pasturage, and I use that term "pasturage" in the ordinary acceptance of the term. To be sure, my land is of a character that is pretty high priced. I bought some pasture land some time ago, and paid \$85 an acre for it. It is a very fine piece of land, and will be used in the growing of corn. I have learned this much: I consider it pretty good judgment on the part of the dairy farmer, owing to the vicissitudes of the seasons, that he should buy such soil so as to have a silo for his cattle. We really do not pasture more than three or four months in the year with any degree of profit, and when you come to the question of selecting the cheapest and most efficient form of cattle food, to-day, it is the summer silo. In the patronage of our creamery we have 800 farmers. We have got forty who have got summer silos. We had a very severe drought from the 4th of April to the 4th of July, and the first crop of hay was almost entirely a failure, but those forty men who had summer silos did not fall off a pound in the shrinkage of their milk. All the others of our 760 patrons shrank all the way from thirty to fifty per cent. Now, that was a serious loss, and how little it really did take to have prevented that loss. Just a little foresight. If the ensilage was not used in the summer time, if the feed happened to be flush and good through the summer, there the silage could have remained ready for use at any time when it was most wanted. So that when we start to consider "What Constitutes a Dairy Farm," the first proposition is that it shall be so arranged that it shall produce an abundance of good dairy food.

Now, we need a large amount of carbonized food which is cheap. We can produce any quantity of carbonized food, and that is really what we put into the silo; but when it comes

to the production of protein and albuminoid foods, there is where we run up against the question of expense. What shall we do? Now, I want to say a word to you about a plant that is attracting a good deal of attention among dairymen in some places, and that is alfalfa. The common red clover has become so ticklish and hazardous a crop that we are getting very much discouraged with it, and we are turning our attention to alfalfa. If you will take alfalfa and dry it, and cut it into short lengths and grind it into the same mechanical condition as bran, it is equal to wheat bran by analysis. There is not one farmer in ten thousand who realizes what a magnificent food it is. It is a ticklish plant in the first year of its growth, but after that it is usually all right. To grow alfalfa you must select a piece of ground that has got at least four feet of good sub-soil, and neither hard-pan or rock, and if it's ten feet it's better, but four will do very well. It is a very powerfully and deep rooted plant, but its growth is something tremendous. I cut four crops last year on my alfalfa piece. I cut between six and seven tons to the acre of the most valuable dairy food I ever produced. In New York, where ten years ago it was never thought of, it has been planted with a good deal of success. I rode for a week among those farmers, and I found that three-fourths of all the hay they produced was alfalfa. Now, they have a clay soil, and the soil is in some places within three or four feet of rock, but it does very well.

Now, if any of you ever try it, I want to leave with you a few directions: First, you must feed the ground extra well, and you must be particular to make a good seed bed. It would be a good thing for anything to have a good seed bed, but it's particularly good for alfalfa. You must sow double what every other man tells you is right. The rule has been twelve or fifteen pounds, but I sow thirty. My seeds costs me ten cents per pound, and I get it from a man in Kearney, Nebraska, who has two thousand acres in alfalfa. It costs me ten cents per pound there, and I have to pay the freight. The freight on it does not amount to very much. The first thing, therefore, is a good seed bed, and the second is plenty of seed, and the third thing is to put in a good nurse crop. You have got to choose between weeds or a nurse crop. You will get weeds if you sow it alone. If you put a nurse crop on, be sure and cut that off for hay the moment it heads out.

Cut it and get it off out of the way. In a bed that I sowed in the spring of 1899, I cut it in the fall, about the first of September. It went through last winter in fairly good shape. Injured a little, but not a great deal, and it has improved with every cutting this summer. The first cutting is the poorest, and after it has been cut three or four times its quality is at the best. Then you come to the problem of cutting it. Now you want to remember that you have got to cure alfalfa in the cock. You want to put up a fair sized cock, and use a hay cap; a simple thing is to get forty-inch wide sheeting, and cut it off forty inches long. It costs but little. The corners should be tied down with old horse shoes, or a bit of iron. I bought a thousand old horse shoes, which cost me about \$3. I use those as weights at the corners. Now, when the alfalfa has been put up in this way it should be opened after two or three days, and then put it back, and let it stand for two or three weeks, and then you can put it in the barn with safety, and when you come to feed it your cows will give you an answer back that will be very convincing. It is rather loosening in its character as feed for horses. I do not, as a rule, feed my horses alfalfa, but it is very generally fed everywhere.

Now, I have touched very slightly on what constitutes a good dairy farm, but when I began to think the matter over, and thought what that subject meant about the construction of the buildings, and almost everything else in relation to it, I concluded I would reserve that for a time when I was not quite so much in a hurry, and had opportunity to go over it carefully and condense it.

Now as to the topic which I have selected to speak upon more particularly this afternoon, — "Some Facts and Figures about Cows." I am convinced that a large proportion of the farmers who are keeping cows in these United States, and fondly hoping to get some profit out of them, do not realize and understand the true situation. They do not realize the loss that comes to them from these poor average cows. If they did, it seems to me, they would bestir themselves at once to make a change to improve their cows by wise breeding, and better care and feeding. They do not use the arithmetic they learned in the little "red schoolhouse." Let me show you how the average "general purpose" cow affects the fortunes of the farmers of one State.

Iowa is one of the best states in the Union. Its farmers are intelligent, and it is fairly peppered with schoolhouses. Iowa has 773 creameries, which made 88,995,355 pounds of butter in 1897. It took ten per cent. of this to supply the home demand, and ninety per cent was shipped. The cows employed in making this butter for that year numbered 745,173. Now, divide the butter by the cows, and you have 119.5 pounds of butter per cow. The total cost to the farmer of making up this butter at the creamery, and marketing it is about as follows:

Delivering milk at the creamery, two and one-fourth cents per pound on butter.

Manufacturing, three cents.

Cost of shipment, one and one-fourth cents.

Total, six and one-half cents.

The average price of Iowa butter in New York for that year, or rather for the last four years, which is better, was 20.77 cents. From this take six and one-half cents, and you have 14.27 cents that the Iowa creamery patron got. Now, multiply the 119.5 pounds of butter his "general purpose" cows gave him by this price, and he has the brave sum of \$17.05 to console himself with for being that sort of a dairyman, and keeping that sort of a cow. But I am not through with him yet. It costs him not less than \$25 to keep that cow as he keeps her, saying nothing of the cost of labor in milking her and caring for her. Some say her manure will pay for that. Well, if her manure is not better cared for than the average farmer in Iowa cares for it there is no Klondike return there. To keep a cow as she should be kept in Iowa, if she is made to do what she ought to do, will cost not less than \$30. That is to say, the feed and pasturage will sell for that sum. Now, do you think, my friends, that this sort of cow can be kept at any less figures in the East? Are you not losing even more than the Iowa farmer by looking at this dairy business from the "general purpose" standpoint? Farmers who keep cows must do better thinking, better breeding, better figuring, and become larger and more intelligent men on this cow question if they expect any profit out of the cows. As yet, nine out of ten refuse to believe it; refuse to see it. The constant cry with them is, "we can't afford to be better posted." This simply means that they can't afford to be suc-

cessful dairymen. Can they afford any longer to be the unsuccessful dairymen they are? Why can these men not see that there is no profit, no success, no independent manhood even in following out the ideas that have hitherto led them? I want to see this great mass of average farmers with their profitless "general purpose" cows either raise their ideas, and the average of their cows, or go into some other kind of farming. It pains me exceedingly to see this constant loss, and the farmer indifferent and oblivious to it.

The wonderful productive capacity of the true dairy cow is clearly illustrated in the record of the dairy herd of Minnesota University for the year 1897. The herd is primarily kept for illustrating breed characteristics, and of those that were in the herd the entire year, and records used in the class of dairy husbandry, one was a Holstein, one a Guernsey, one an Ayrshire, three grade shorthorns, and one a native. Now, in Minnesota, they are in an exceptionally good situation for cheap food, but that is not the only fact of it; the cow that gives you the most butter produces her fat in a constantly decreasing ratio of cost. I have been taking a census of one hundred herds in Iowa, and another in my own State of Wisconsin, and I am now at work taking a census in Minnesota, and another in New York, and if I can find anybody that will hunt up one hundred herds here, and look after the matter I will take one here. I want to get at just what one hundred herds cost, and just what they will do. Now, some of the figures and deductions that have come out as the result of some of these investigations are very suggestive and instructive. In Minnesota where this herd that I referred to was kept at the university, every milking of each cow was weighed and tested for butter fat. All the feed was weighed out to them, and a careful record kept of the cost of the feed. The native cow cost for keep during the year \$13.58, while the Holstein cost \$22.94; the cost for feed and pasture for the others ranged within those figures. The Holstein gave 312 pounds of butter, the native gave 306 pounds, the Ayrshire 310, the Jersey 427, the Guernsey 474, while the three grade Shorthorns averaged 325. The average cost for feed and pasture during the year was \$19. The average yield of milk was 6,962 pounds. The average yield of butter was 351 pounds, and the average cost for feed to produce a pound of butter was 5.4 cents.

During the year the average net return per pound of butter in Minnesota from cows contributing milk to creameries was fifteen cents. So, crediting the cows with fifteen cents per pound, the average return per cow would be \$50 a year. Adding to this the value of the skim milk for feeding purposes at fifteen cents per 100 pounds, and we have the total receipts per cow of \$59.13. Deducting \$19.03, the average cost for feed, and we have a net return per cow of \$40.10, or a return of \$3 worth of dairy products for every dollar's worth of feed consumed. Now, in this cow census that I have taken I figured every cow down to the dollar's worth of feed consumed, and then ascertained what her product was, and I found such a wide range in this matter that it has been astonishing to me. I found that one man received \$2.08 for every dollar's worth of feed he expended on his cows, and another man received a loss of ninety-six cents on every dollar's worth. That was in Minnesota. In Iowa one man received only forty-four cents for every dollar's worth of feed he expended on his cows. Now, that shows a very wide variation, and when you come to conduct an actual inquiry into the work of these farmers you see where the great deficiency is. It is a tremendous deficiency, and that is the reason to-day why so many farmers groan under the weight of their expenses, and it shows why many other men in the business flourish. It is because the other men use a pencil point, and use intelligence, and use arithmetic; they use their brains, and the result shows it pays; while, on the other hand, the unsuccessful farmer folds his hands and says he trusts God because he is helpless and weak. Well, God has a good deal laid at his door. He is good, but he has my sympathy once in a while when he is blamed for not blessing the shiftless farmer who can't see where he might succeed if he would.

During the years 1895, 1896, and 1897 the average yield of milk per cow, including the entire herd at Minnesota University, was 7,275 pounds; the average yield of butter was 350.6 pounds, and the average cost of feed, including pasture, was \$23.21. Crediting the cow fifteen cents per pound for butter (though it was all sold for twenty cents), and fifteen cents a hundred pounds for skim milk, and we have a total average annual return per cow of \$62.13, it being an average return for dairy products of \$2.67 for every dollar's worth of feed con-

sumed, and an average net return per cow over cost of feed of \$38.92.

During the three years covered by this record, fully half the cows in the herd were common cows carrying more or less Shorthorn blood. The others, of course, were good representatives of the dairy breeds, and their grades, and had much to do in bringing the net returns to such a high figure. Now let us spend a few moments in an analysis of the figures given in connection with the above-named cows. The native cow, and she was a remarkably good one, produced \$45.90 worth of butter. The cost of her food was \$13.58, leaving \$32.32 profit. The Holstein produced \$46.80 worth of butter, and the cost of her food was \$22.94, leaving \$23.86 profit. The record does not give the individual cost of keep of the Ayrshire, Jersey, Guernsey, and Shorthorns, but if we take the average cost of all and apply it to their cases, which was \$19, that would give the Ayrshire a profit of \$27.50, the Jersey \$45.05, the Guernsey \$52.10, and the Shorthorns \$29.75 each. This, you should remember, is at the low price of fifteen cents per pound for butter, offset, however, by a remarkably low cost of feed. These figures throw a strong light upon the proposition that you must look for the best profit in butter production to those cows that have been bred for butter. The two butter bred cows in this lot show nearly double the net profit over all others. The figures also show that the feed cost is remarkably low. This is partially brought about by the low cost of wheat bran and prairie hay, and largely by the fact that the cows were fed by Professor Haecker, a man who has learned that there is a large profit in learning the science of dairy feeding. Another thing is shown, and would be more clearly shown if you could see these cows, and judge them somewhat in the light of their type and form. Just in proportion as these cows were endowed with dairy form and function did they respond in performance and profit. Just in proportion as the men who bred those cows used dairy intelligence in their breeding did they reward the owner in the butter test and in the pocket. Where did so many farmers get the idea that they need pay no attention to the kind of seed that they sow? God established the law that all animals should bring forth each after its kind. Can you sow beef and reap butter? Turn to the men who keep records, who know what they are

about, who have a basis of clearly established facts for what they think, and you will find them in company with dairy bred cows. You will find it so every time. They are the men who are doing such excellent work. They are the men who have a clear insight into what constitutes a dairy method. They are the men who are making dairying profitable. Upon the other hand, turn to the men who keep no records, who guess at everything, and groan because they make no profit, and you will find them keeping company with "general purpose" cows. Now remember these facts and figures. Take them home with you, please, and when men tell you, or you think yourself, you cannot make any profit from cows, reflect, that these Guernsey and Jersey cows, whose blood contains dairy quality, put there by good dairy sense, did make a profit, one of \$45, and the other of \$52 at the low price of fifteen cents a pound for the butter, and remember also that no account is taken of the value of the skim milk or manure.

I am a patron of Hoard's Creameries. I have forty cows. I keep them for the value of their stock, and also for the value of their milk. In my barn there is a tread mill, and the bull has to take his place in that mill daily. He has to march on that tread power when he is not proceeding at the head of the herd. It's a good thing for him, for it takes a whole lot of mischief out of him, for Satan finds a lot of evil work for idle bulls to do. I know that. I have had two fights with them in my life, and I don't want any more. Now that animal goes on to that tread power when there are two pails of milk drawn from the cows, and he starts his work. He is going all the time. He is separating that skim milk in the separator in that little room in the barn, and it is fed warm and sweet quickly to the pigs and calves, and then it is worth at least double what it is worth on the average when it is taken to the creamery. That skim milk goes into a clean vat every morning. There are two vats. One is kept thoroughly cleaned and scalded out, so that the farmer who takes it gets it in the best possible condition, and I can see a wonderful difference in the feeding value of that skim milk when it is fed warm and quickly to the calves and pigs. Just do a little figuring to see what the value of it is. See what its value is when fed to a good grade Jersey heifer. It will take 4,000 pounds of skim milk to rear her up to eight months old. I will use a dollar's worth of flaxseed.

It can be got at the druggists. I will buy ten pounds, and pay about ten cents a pound. I will put a little of that flaxseed meal into the milk, and commence to feed her, and when she is eight months old I can sell her easily for from \$16 to \$18. By that time she is a fine heifer calf. Now, men say you can't tell what skim milk is worth. I can, and I will. I find that skim milk is a mighty good thing. When pigs are worth \$4.50 live weight, skim milk is worth to me twenty-five cents a hundred pounds, for every hundred pounds will make five pounds of pork. These are things that we have wrought out by hard thinking and practice. At that creamery we have spent hundreds of dollars in experiments along these feeding lines, and just by the little trick of putting two and two together it has been demonstrated that by feeding them together you can increase the value of skim milk as a feed twenty per cent. These are facts that have been wrought out by hard thinking and experimenting, and facts that have been published time and time again, and yet, though an angel came down from heaven and made that statement to some men, they would not be convinced there was anything to it.

Not long since a very successful dairy farmer in my own county related to me the substance of a conversation he had had with a neighbor who had complained to him seriously that he was running in debt with his cows, and could not see how his more successful neighbor made money. The conversation fits the situation so completely in thousands of instances that I have written it out as near as I can recall it, and for the sake of designation I have called it a talk between a wise and an unwise dairyman. They met at the creamery where both take their milk, and the following talk ensued:

The successful man I will call Mr. "A," and the unsuccessful dairyman I will call Mr. "B."

Mr. B: "Say, neighbor, how many cows are you keeping this year?"

Mr. A: "Twenty-two."

Mr. B: "Well, I have thirty, and I declare I haven't got enough money out of them to pay my store bills. No man can keep from running behind with butter at such a low price. How much did you get from your cows last year?"

Mr. A. "The creamery paid me \$1,034 for the past year's milk, which amounts to \$47 a head for my cows. Beside that,

my family and hired help had all the milk, cream, and butter we wanted for the year. In addition I raised ten as fine Guernsey grade heifers as you often see, fattened a good bunch of pork, and sold \$300 worth of hay and grain from the farm. My wife handled the eggs and poultry, and made a good bit of pin money on that. Those Guernsey grade heifers I can sell to-day for \$18 a piece. I cannot see how I have any reason to complain, nor how I could have done any better in any other kind of farming."

Mr. B: "Well, I can't understand it. I suppose it's just my cussed luck, for I have run behind the whole year."

Mr. A: "See here, Neighbor 'B,' let me tell you where the trouble lies. You don't believe in being a first-class dairyman, with first-class cows, and first-class ideas. You have often joked me about my cat-hammed Guernsey bull; about my 'sourkraut tub,' as you called my silo, and when I once showed you a picture of a fine cow in *Hoard's Dairyman* you asked me if I was fool enough to take that paper? For years, I could see by what you do, and what you say that you do not take any stock in the idea of improved dairy farming. With you its just the same kind of farm management, same kind of feed, and same kind of cows that you started with twenty years ago. You have kept a cheap scrub bull at the head of your herd for years. You don't believe in dairy blood, for if you did you would try and breed some of it into your heifers. You have often told me that you did not believe a word of this talk about a balanced ration, and so far as the silo is concerned you wouldn't have one on your farm. Now, I do believe in all these things; in all these ideas of improvement. I can't see how a man is going to make a cent of profit if he has such cows as you have been providing yourself with. My silo helps me to feed a cheap ration, get good money out of it, and sell some hay and grain. When I raise a heifer she has good dairy blood in her, and lots of men want her at a good price. If I keep her there is a big chance in my favor that she will be all the better as a cow for the dairy blood there is in her. Now, as a fair question, don't you think my belief is bringing me more money, and more clean profit than your disbelief is bringing you? Don't it look so?"

Mr. B shook his head doubtfully, and went to his milk wagon, still unwilling to believe that he was in the wrong in

his ideas of dairy farming. There is a great surplus of Mr. B's all over the land, and few, too few, Mr. A's. These low returns for dairy products ought to show the Mr. B's where the trouble lies. It would naturally seem as if any set of men with ordinary business judgment would think by this time that they had paid about enough for the fun of keeping poor "general purpose" cows, turning their back on good dairy thought, and advertising to the world by their actions that they think the less a man knows about his own business the more profit it is to him. Of course, the effect will finally be to drive this class of farmers out of the business. The sooner the men get out of it who persist in keeping a class of cows that cannot be made to pay the cost of their keep, and who will not try to make intelligent dairymen of themselves, the better it will be for the Mr. A's, and the dairy farmers of that sort. Now, let me say that this applies just as truly to the men who are making milk for the market as it does to the men making cream for the creamery. There is no difference whatever in the general proposition as a matter of dairy economy as to which way you turn this milk. The general proposition comes right back to the same thing in every particular in either case. The man that feeds and breeds for the best condition of milk production is the man who feeds and breeds for the best condition of butter production, and the sooner the men get out of the business who persist in keeping a grade of cows that cannot be made to pay, the better it will be for dairying everywhere.

Now I want to say a few words about the "Average Dairyman." There are a great many farmers who are thinking of going into dairying. As a rule they have been grain farmers, but who have handled cattle more or less since they were boys. Very likely they have kept cows, milked cows, and had cows about them all their lives. They easily fall into the error of thinking that with their present ideas about cows they can make a good profit from the dairy, but candor compels me to say they are mistaken. The return they will get no man should be satisfied with. There is no branch of farming that calls for as much close thinking, close economy of management, and right understanding of animal life as dairying. Every day adds testimony to the statement that there is no profit whatever in the average ideas farmers have, or the

average cows they keep. Take the older dairy section of the East. Why is it the farms there have gone down in value from fifty to seventy-five per cent? Why is it they have done that inside of twenty-five years? Why is it these lands have decreased in fertility, and in the power to produce cow food? Why is it in many sections the farms have been sold out under mortgage, and the banks will no longer loan money on farm property? Why is it the cows in those sections will average but little if any better in milk producing capacity than did the cows forty years ago? Why is it the farmers here with altogether too few exceptions are producing milk just as expensively as they ever did? Now these are pertinent, economical questions, and it is of great moment to you farmers of the East that they should be answered rightly. I may not add to my popularity here by asking them, but that does not make any difference; if I can help to solve them I shall be content. Now, there has been a wonderful advance in labor-saving machinery for the dairy, and in the knowledge of the chemistry and physics of the dairy; in decrease of cost of transportation, in the certainty and facilities of the markets in everything and everywhere. In fact there seems to have been an advance in everything, and along all lines except in the judgment of the average farmer, and in the average productiveness of cows. We have made a great advance in the matter of farm and dairy education. We have experiment stations where the truth of things is worked out at public expense. We have our dairy schools where young men can learn all that the most advanced science and art has demonstrated in dairy practice. We have short courses in agriculture, where, in three months, at small expense, the farmer's boy can learn more of the real truth about farming than his father was able to acquire in years.

That lecture that you listened to by Professor Woods, remarkable because of its statements of the latest known facts concerning the biology of the cow, was a thing that you could no more have had thirty years ago when your fathers commenced the study of the cow than you could have of the farthest thing in the world. I ransacked all Europe for books upon this question, and in every language that it was possible to obtain any. It's only within recent years that such things

have been possible. I sometimes think that our farmers do not begin to appreciate the progress that has been made.

We have our farm institutes traveling over the states, and manned by the best practical teachers we can procure. We have the best dairy papers, dairy books, and dairy literature scattered broadcast over the land. All these things we have, and still the average farmer with his average cow is just about where he was forty years ago. The average cow yields the same 3,000 pounds of milk that she did when I was a boy, and the average farmer produces the milk from her just as expensively as ever. There is something wrong here. Who is it, and where is it, and what is it? I maintain that it is the average farmer and his refusal to educate himself. He is trying to handle cows with no more study, no more knowledge, and no more understanding than his father had before him. Here is a good test of the truth of what I say. All this knowledge, all this improvement, and all this invention I have spoken of must be conveyed to the people by the printing press. Not one of these average farmers in 500, even though he is keeping cows, is a studious reader of dairy literature. Whenever you find one that is such a reader you can see the effect of it upon his fortune at once. He has put himself in the current of better ideas, and he reads the experiences of men who are doing dairy work in the better way. I am not saying this because I print a dairy paper, for no matter who says it, it is everlastingly true. Ask any cheese factory or creamery proprietor in the land who, among his patrons, has the best cows; who it is that has a silo, and is the best feeder, and receives the largest revenue from the concern, and he will tell you, nine times out of ten, that it is the man who reads the dairy literature of the day.

The Spaniards have a proverb which says "a dull mind will work with a dull tool." The first step towards bringing a man up out of the unprofitable average rank is to brighten his mind, and thus get him to see the better truth. For years I have spent some portion of each year in the once famous dairy region of Central New York. I meet plenty of people there who are groaning over hard times; who say they cannot make any money from their cows. I have visited their homes, looked over their herds, examined their stables, and inquired into their methods, and universally all these things

were just where they were forty years ago. The cows were a hodge podge of all sorts and breeds; no steadfast, enlightened breeding judgment had been used, for they had never studied the principles of dairy breeding. The same old underground stables; dark, unventilated, and unhealthy; the same uncomfortable stanchions; the same way of piling up manure under the eaves to lose half its value before it is drawn onto the field. The same old practice in numerous cases of turning the cows out to wander about over the fields in the snow from nine o'clock until four in the afternoon. In many cases I found them scattering hay over the ground; hay worth ten or fifteen dollars a ton fed in that wasteful manner. I inquired into the reason why these men practiced these undairylike methods, and found that that was the way they did when they were boys. There was no thought upon their part that they were wasteful and expensive methods, and that too with farms not half so productive as when they were boys. No man on earth can make a cent of profit with such cows and such methods. You will find that these men are not readers of dairy thought, or the dairy experiences of other men. The old saying is that "the exception proves the rule." The rule is waste, and no profit for the exception. Scattered here and there you can find a bright reading dairyman, with good cows of some one straight dairy breed, with comfortable and well lighted stables, and clear ideas about feeding and good farm management. Invariably that man is making a profit. He is not an average dairyman. He is more than average. It's a good deal like a remark of old Bill Pallman, who was a brick mason. He was working for me one day, and I said: "Bill, that chimney isn't right." He said, "What's the matter with it?" I said, "Why, it isn't plumb. That's what is the matter with it." He looked at it a moment, and he said, "Be gorra, it isn't. It's more than plumb." Now, it's just that. I want the farmers of this country who are engaged in the dairy business to be more than average dairymen. I want every farmer to be just inspired with this thought, that he must be more than the average keeper of cows if he would attain the best success. He must not say: "I will stand here and measure myself by my neighbors about me. I will find out what is the measure from the standard of the best management." A farmer who puts himself in that attitude, invariably,

I might say, is a reader, or a man who becomes one, and because he is a reader he is a student of the cow; he is carried along by the current of the thought that he reads. He falls at once into a study of the science of feeding. You know in this world that a thing thrives upon that which it feeds upon. So it is with the farmer. He finds himself in the company of other men who are earnest students like himself. He becomes a student of methods. He sees at once that the old methods of managing a dairy and dairy farm are wasteful both of the soil and his profit. His interest is aroused on the question of better and more healthful stabling. He has turned the light on his pathway.

I built a barn this last summer that cost \$3,000 or \$4,000. I sent for Professor King of our university, and I said to him: "I want you to put in your system of ventilation here." He proceeded to do so, and I had forty or fifty of my neighbors visit the place, and some said, "Hoard, you are spending a lot of money here. Will it pay?" "Well," I said, "I am convinced it's the right thing, and if I can stay long enough here upon earth I will get pay for it." That barn to-day keeps the temperature just about where I am a mind to keep it. I try to keep it at about a certain average, and the air is constantly changing in that whole barn, and is kept sweet and pure, and healthful. It never freezes. You can't freeze it, as the air changes in the barn every hour. You step into the barn, and you can hardly note the difference except in temperature, and yet I would like my farmer friends to note the difference between the smell of that barn with forty cows in it, and the smell of an ordinary cow barn. Plaster is scattered in the gutters every night and morning, and when I shut that barn up at night, and go in in the morning, the difference is surprising between the state of the air in that barn and that in an ordinary cow stable. The lungs of the cow demand just as clean, pure air as you can get, and yet many a farmer shuts his cows up because he thinks that he must keep them warm, and he just poisons them to death with impure, fetid air. This can be easily proven by the effect of pure and impure air on a flame. Good air is necessary to combustion. Air that will not support combustion will not support respiration. You go down into one of these old wells. What do you do first? You want to find out where it's safe, so you let a light

down. Why? Because the carbon dioxide and carbonic acid gas accumulates, and it's dangerous to life. Now, the lungs throw off carbonic acid gas, and it needs to be carried off in changes of the air. So it is in a stable. If you do not give proper ventilation, and get rid of this foul air, and it keeps piling up in the stable, by and by it reaches the breathing apparatus of the animal, and makes her restless and uneasy. She can't lay down and rest. She gets up in distress. Cows are poisoned in our barns constantly in just that way. If any of you would like to examine in detail the system of ventilation in use in that barn you can find it in the columns of *Hoard's Dairyman*. It has been illustrated there repeatedly, as well as other systems, but this system is the most effective I have ever seen. I can keep that barn perfectly sweet and clean, and always above the freezing point. All these things belong to the literature of our business, and no progressive dairyman can afford to ignore any of these elements which all play a part in the success or failure of his business. I know of hundreds of men all over the United States, from Texas to Maine, who make from \$25 to \$40 net profit per cow above the cost of food, and these average cow keepers about them are as dull and irresponsive to their presence as if they never existed. The one man sees that dairying means brain work. The other ten do not see it.

Now, my friends, I will finish with one little statement. The Hoard Creameries in Fort Atkinson find this difference in the amount paid to the patrons per hundred for their milk: Highest amount, \$1.36 per hundred; lowest, 89 cents. Now, the herd that receives \$1.36 gave the largest amount per cow of any in the 103 herds sending milk to the creamery. Don't you think a difference of forty-six cents a hundred is too much to pay for refusing to learn the lesson of good dairying?

Here is a creamery difference: The Fairmount Creamery at Upper Uwchland, Pa., paid its patrons for the month of July, 1896, twenty-two cents a pound for the butter made at the creamery. At the same time and for the same months the creamery at Salem, South Dakota, paid its patrons 11.3 cents a pound for their butter. One creamery got 10.7 cents more for its butter than the other. Would you know why? Difference in the patrons, that is all. The Pennsylvania patrons understood that every act of theirs told on the quality of

the butter, and that quality is what governs. The Dakota patrons did not take any stock in such ideas, and they paid for their indifference and skepticism at the rate of over ten cents a pound on their butter. Which pays the best and most, faith or unbelief? You and I know plenty of men who say that they cannot afford to spend a dollar a year for information, and yet who spend hundreds of dollars for what their lack of dairy knowledge costs them. And thus endeth another lesson.

Now, I don't know how long I am going to continue to preach this gospel according to the cow, for I don't know how long I am going to find reason for preaching it, but one thing I want to frankly confess to you, my friends, and that is, I am no such example of performance and virtue as does not find need to take its own medicine about twice every day. What has beaten me all the time is what I do not know. Having in view what I do know, and what I have found out, I still have in view the great fact that I know but little. I don't think I know more than half as much now as I used to think I knew, but, my friends, whether I am in Connecticut, or California, or Washington, there is one great mistake that I find men making everywhere, and that is, they are doing business from the local standard. The local standard. That should not be. Dairying should be conducted from a national standard. There is no business to-day in the United States where the principles apply so widely as in dairying. In every State in the Union the cow is the same. The principles of feeding are the same; the constituent elements of the milk are the same; the question of housing is the same; her maternity is the same, and the same laws govern her maternity, and yet there are any number of men who say that the cow is to be handled altogether different in Connecticut than in Wisconsin. Oh, no. That is not so. You have got to know the cow, and that which conduces to her good and her comfort. That is the law that governs success in dairying everywhere.

My friends, I always love to come to this old Nutmeg State, and talk to the people in it. I never have to attach a dictionary to anything I say in order to have it understood. I never tell a joke without its being appreciated, if it's good. I never have been guilty of telling a joke here, and then

been obliged to go into a long explanation to make it understood, and so took all the joke out of it. There are some people who cannot see a joke, but I never found them in Connecticut. Now, I am going to close with a little story for your entertainment. My wife is really a very funny woman. She said to me one day, "William, how do you spell a certain word?" I said, "Go, look in the dictionary," and she said, "Oh, they have their own way of spelling in that, and I never can find anything in there." Now, on the opposite, I was talking with an old German friend of mine, and I said to him, "Hans, it's a funny thing to me that you Germans can't enjoy a joke. You have wit, you have learning, you have sarcasm, you have all the intellectual endowments belonging to the most advanced nations, but you don't seem to have any sense of humor. You Germans don't seem to catch on. You look as helpless before an American joke as a baby." He looked at me in a kind of a puzzled sort of a way, and he said, "I don't believe that is so at all. You tell me some joke I can't understand." Being thus challenged, I said to him, "Well, here is one: I remember having heard it said about a man that his feet were so large that he had to use the forks of a road for a boot jack." Well, it nearly paralyzed me to see the way the old man proceeded to analyze that. In that contentious way which a German has, he put his fore-finger up against his nose, and he commenced to repeat it to himself,—"Feet so large, feet so large, — had to use the fork of a road for a boot jack, — that is no joke, man, that is one — lie."

Music.

Secretary GOLD. I suppose you are all expecting to ply our friend with questions. There have been a number submitted, and if you will excuse me, Governor Hoard, I will read them all at once, and then you can attempt such answers as you see fit.

QUESTION. "Suppose you have a small dairy farm on which corn will produce more food than anything else per acre, would it be best to plant all the ground to corn, and buy grain to make up the deficiency in the food elements found

lacking, or would it be best to raise part corn, and part of any other kind of food needed, and avoid buying? One way you could keep more stock than the other. Which way would give just a neat balance? Are roots preferable to raise for food, and if so, which are the best kinds to raise?"

QUESTION. "Will Governor Hoard describe a good stall, and method of tying?"

QUESTION. "Would Governor Hoard cross a Holstein cow with a good Guernsey bull to supply the retail milk trade where forty per cent. milk is demanded?"

QUESTION. "Well ventilated stables. Is it advisable or profitable in the long run to house cattle constantly, or not to confine them too closely, but allow them out for daily exercise?"

Governor HOARD. Well, to take up the last question first, I think not. I think all cattle ought to be turned out a little every day, provided the weather is not too inclement so as to give them a chance to fill their lungs, and to rub in the open air.

As to the question of crossing the Holstein and Guernsey, I should say not usually. I do not believe in hybrid breeding. I know a great many people think that way, but the Holstein has certain propensities or characteristics peculiar to that breed, and the Guernsey also has certain propensities, and when the two breeds are crossed these do not seem to mix well. The Jerseys and the Guernseys and the Ayrshires take more kindly to each other in this respect. Some of the best cows we have are Ayrshire grade mixed with the Jersey or Guernsey type. So also Shorthorns and Guernseys mix kindly together. Shorthorns or Jerseys mix very well with the Guernsey type. Shorthorns are rather negative in dairy propensity; quite negative, and when crossed the positive propensity of the sire takes possession. In crossing you must unite these currents of function together, and if you are wise you will unite them so that they will harmonize, and you will

therefore get a better result. I do not believe much in crossing, but you will find, as a rule, I think, that the Holstein would not be improved by that sort of breeding.

Now, you ask for a plan for a good stall, and method of tying cows. I use what is known as one of the modern stalls, many of which have been illustrated in the papers a hundred times. The great object is to select a form where the cow will be comfortable, and which can be kept clean and free from dirt, and where the cow herself can be kept free from dirt and manure stains. Consequently, I tie a cow in a form of rack which forces her back when she stands, and ahead when she lies down. She is fed in a rack that stands well up from the floor so that when she gets up she has to step back. Across the floor in front of her hind toes is a piece 4x4, and the space forward of that is filled with bedding, so that there is a little table or platform up there of bedding. Now, when the cow stands up, the fore feet are on this bedding, and her hind feet back of this 4x4. She is tied with a hanger, and when she lies down she is forced forward so that she gets up into this dry bedding, and her head goes forward under the stall. When she stands up she is obliged to stand back so that her droppings all fall back of this space, so that when she lies down she never gets dirty.

QUESTION. How high above the floor is this rack?

MR. HOARD. Oh, about forty inches. From thirty-six to forty inches.

QUESTION. Where do you drop the corn or ensilage?

MR. HOARD. In a box right there in front of her, that projects into the stall.

QUESTION. How high is the box?

MR. HOARD. Just high enough to allow her to reach it comfortably.

QUESTION. When she lies down, doesn't she lie on this slab you speak of?

Mr. HOARD. Yes, she tries it in the first place, but as she is forced forward she hitches along and gets inside of it.

QUESTION. How many inches is that from the head of the gutter?

Mr. HOARD. It's eight or ten from what you mean. There is no gutter at all. The floor planking comes back to within eight or ten inches of that. This stable floor comes back, and it is two inches higher, and back of that is a space which forms all the gutter there is. I do not like a gutter.

QUESTION. Don't they some times wet this platform or soil it ahead of that slab?

Mr. HOARD. The cow can't lie down where she stands. She is forced forward. When she stands she is forced back so that she stands in such a way that all that is thrown back falls into this space back of the platform on which she lies. If you will write me I will send you an engraving of it together with a description. I keep publishing it once in a while. There is no other system that I have seen in operation that forces the cow ahead like this, and so tends to keep her so clean.

QUESTION. Where is this feeding box located?

Mr. HOARD. It is alongside of the cow directly under the rack.

QUESTION. How do you water your cows?

Mr. HOARD. In the yard. I have a large tank in the barn also. In front of the feeding manger I run my ensilage cart, and my grain cart. Right in front of each section there is a long fourteen foot board, two feet wide, that lifts up and opens into the manger, and when I want to feed the cows I turn that right up, the whole length of the section, before seven or eight cows, and throw the feed in front of them into these boxes. The ensilage is put into the racks, and it will drop down in front of them, or they will pull it down in front of them.

Now let me answer that other question before I forget it.

The question was asked, are roots profitable to raise for feed? Yes, roots are always profitable feed, but ensilage is an excellent food that can be fed cheaper, and raised easier, and is something which takes the place of roots entirely unless it be for a stomachic quality; that is, a quality which aids digestion.

Now, I want to refer to this question which was asked, because there is a good deal to it. "Suppose you have a small dairy farm on which corn will produce more food than anything else per acre. Would it be best to plant all the ground to corn and buy grain to make up the deficiency in the food elements found lacking, or would it be best to raise part corn, and part of any other balanced food, and avoid buying feed?" Now, my friends, I am a stickler about buying feed. I buy feed all the time, but I sell something else to buy it with. I cannot produce a balanced ration thoroughly until I get my alfalfa fields going better. Then I will on my farm. I sell corn, or I sell oats as I have them, and I buy oil meal, and I buy bran by the car load. I would prefer to sell something to buy these feeds with for if feed is high in price the rest is well up as a rule. Some farmers have a great horror of buying these protein foods, but they must be had. This is a large question, but I do not think it's in condition to be answered satisfactorily yet.

Secretary GOLD. There was another question here which I think was intended for Governor Hoard. "Is it better to raise the hornless breed of cattle than to dehorn the horned breeds?"

Governor HOARD. I believe in following nature as close as possible.

A MEMBER. One of those questions, I think, referred to the soy bean, but I didn't hear that read. I would like to ask the governor if he has had any experience with it in connection with silos?

Governor HOARD. I have not. There is no plant for en-

silage comparable with the corn plant, or for the production of those elements so much needed in cattle feeds. I think it's because there is not starch enough in them. They do not possess the elements to raise sufficient heat to cure them when used for the silo. The whole art of preserving silage is to get heat enough. That is where the difficulty lies. The reason is that the heat passes off, and the result is you never get that part of the ensilage up to that heat that will kill the germs of fermentation, but you get it just high enough to promote the process of curing. If you can prevent that heat passing off that is generated by the process of fermentation, that is the whole art of it. Now, with soy beans, and alfalfa, and these clovers, I suppose theoretically it's all right, but for a silo I should think they would do better, and especially the soy bean, if mixed with corn than they would alone, because the corn produces more heat.

QUESTION. Governor: Can you give any rule to fix the value of a cow; that is, if you are going to purchase, or if you want to sell?

Governor HOARD. Well, suppose a cow makes 300 pounds of butter a year, and it takes the value of about 150 pounds to keep the cow. That leaves an excess of 150 pounds. Now, 150 pounds at twenty-seven and one-half cents, which we will assume is the average price of butter in the average market, represents the interest on just so much capital. That is a proper way of treating it. That should give you approximately what that cow is worth. Another cow, which makes 400 pounds, gives you 250 pounds for profit, and a cow making 450 pounds, 300 pounds for profit. I don't know of any other rule by which to figure it rightly except to regard the return of the cow in profit as interest on so much capital invested. That shows somewhere near what she is worth to you. What her record shows she will do. When I buy a cow I would rather pay \$100 for a cow making 300 pounds of butter than to pay \$50 for a cow making 250

pounds. That is just another point which shows the value of a good cow, and why only good cows should be kept.

Convention adjourned to 7.30 P. M.

EVENING SESSION.

December 13, 1900.

Convention called to order at 7.30 P. M., His Excellency, Governor Lounsbury, President, in the chair.

By request, Mr. Seeley presided.

Music by the Yale Quartet.

The PRESIDENT. Now, we have had the farmer discussed under most all conditions except one, and that is the topic of this evening, "The Farmer in Public Life," and I am very happy indeed to state to you that a distinguished representative of the press in this city will speak to you on that topic, Colonel Norris G. Osborn.

THE FARMER IN PUBLIC LIFE.

COLONEL NORRIS G. OSBORN, NEW HAVEN.

Mr. OSBORN. Mr. Chairman, Ladies and Gentlemen: I do not know how many of you realize the alarm that was occasioned among my fellow workers of the press when it was announced that I was to speak to you upon "The Farmer in Public Life." Exactly what they expected me to do I do not know. Presumptively they expected me to do something to the farmer, but whether they intended me to run away with his property, or lift some of his mortgages, or go off with his summer stock and transform it into winter stock, I do not know. But I have had that delightful feeling of being rebuked for my impertinence in attempting to speak to you upon this topic, and at the same time of being defended by more appreciative friends for living up to the purposes and prerogatives of my profession. I do not know of any better

excuse that I can offer for attempting to speak to you this evening upon this topic than to illustrate by a story, if that can be permitted in a body so august as this. It explains, however, my mission here. As you may know, in England they eat their eggs from the shell, by cutting off the top. An American lady visiting our Ambassador at the Court of St. James, in attempting to manipulate her egg, dropped it, and, in some embarrassment, she said to that official: "What shall I do, Mr. Choate? I have dropped my egg." He turned to her in a semi-serious way and said: "Cackle, madam. Cackle." Now, while that may not have a direct connection with my subject, I thought it would tend to put us sympathetically in touch, as we ought to be, in order to pass to the consideration of this subject of "The Farmer in Public Life." I am to "cackle."

It is a very great pleasure to me, more perhaps than I have the power to express, to be here with you, and to have this opportunity to say directly the few things I have to say. It has been my good fortune to meet almost every class of people in the State of Connecticut, but I have never before had the pleasure of meeting the farmer, except in an individual capacity, in the way of trade or barter, where he usually has had me at his mercy, and, as I have usually gone down in the gloom of defeat, my feelings are such that it would undoubtedly be more in keeping for me to describe that treatment before some other body. As you may apprehend, there were moments in our experience when perhaps there was not that close cordiality there would have been had he regarded me as less of a victim and I had regarded him as more of a friend and comforter. I have often wondered whether the farmer realized how much he was like the human beings of the city. Of course he has the unique and delightful experience of sitting at sundown on his front porch, when the labors of the day are over, and discussing public questions with his neighbors, but, as it has sometimes seemed to me, he does so without regard to his relation to us living in the cities of the State. His attitude has been ultra independent. I have often wondered whether that particular characteristic of his life proceeded from the fact that he is his own producer and his own dealer, and, in fact, his own everything, in strong contrast with those of us in the city — whether he had not, at the

same time, through that spirit of independence, misunderstood the point of view of those who live in the city, and who have perhaps a more general idea of their relation to their fellow men.

I remember when Governor Waller was Governor of this State. (I had the delightful experience of carrying a sword and looking fierce under his patronage.) I recollect a speech he made in which he indulged in a dream that some day he was to amass a large fortune and retire to a farm. I have the feeling now that the day may come when I can get up with the same purpose you do early in the morning, and hear the birds sing, and continue working throughout the day in order to hear those songs again in the evening, and then continue to work until night shuts down over the scene. I have sometimes looked forward to that day, because in the city we are denied such privileges. But, after all, these things are but fanciful.

I want to ask whether, after all, you men who live in the small towns, you men who till the earth, whether, after all, it is not for our common advantage to come closer and closer together rather than, as our politicians would like to have us do, stay further and further apart? There are certain things, certain things that I do not know that I can state clearly and properly before you, but certain things which ought to be said, and they ought to be studied by the farmer; certain things which ought to be said by the residents of the farms to the city and by those of the city to the farmers. It does not really make very much difference which speaks first, provided we can, by having respect each for the opinion of the other, reach an agreement, reach a common ground. If we can arrive at some agreement by which we may not only live in peace and plenty in our own State, but live together coöperatively with reference to the welfare of the whole State, and to our own country, much will be gained.

Now, there are certain things that we have very much in common. The first is that it does not make any difference where we live — whether we live in Union or whether we live in New Haven. Our common interest is the same, viewed from my standpoint. We all want, I assume, an honest ballot. I do not know of any influence or evil which plays such serious havoc with the principles of government

under which we are living as a ballot law which is either imperfect in itself or imperfect in its application. Now, I do not know, and for the purpose of these particular few remarks I do not know that I care whether I am alone in this condition of mind or whether you agree with me, but presuming that you do in that statement, then we arrive at a conclusion wherein we can coöperate. Now, we have in the State of Connecticut a ballot law which, on the whole, is good, but it is not seriously framed for the purpose of carrying out all the objects and ideas of the American electorate. The system of it is helpful in that direction. It does assist us wonderfully in attaining what we want, but it does not do all that a ballot law should do, that is, to make it absolutely sure, so far as human coöperation can, that we are reaching the maximum of honest results, whereby each man's honesty is put to the test, as well as each man's intelligence. When you separate a man's honesty from his intelligence, or his intelligence from his honesty, you are sure to strike a result which is far from satisfactory. It is a belief of mine, and it is a belief which I think is good for the farmer, that our machinery of balloting should be absolutely in the hands of the State; that is, the State should provide the ballots, print them; should provide election officials, and should take out of the hands of the politicians the distribution of the ballots, and should have oversight over the distribution of the pasters which play so large a part in the corruption of the voter. There is where we can meet on common grounds. Of course, the ideal solution, as I look at it, is the voting machine, which removes all the danger; danger which now exists through the uses of these pieces of paper which we call ballots. But we have at least the one essential upon which we do agree, and that is, a common desire for an honest vote. Now, to tell you, without going further with that particular subject, which is a long one, but to illustrate what I would do with the ballot, permit me to tell another story, and this time I hope if there are those present who are mothers-in-law they will not be offended. The victim of this particular mother-in-law story was a gentleman in whose house the mother-in-law had contracted a cold, so that she was required to be indoors a considerable time. She was in an irascible condition. The gentleman's wife finally said to him: "Don't you think I

had better take mother South?" And in his enthusiasm he immediately said "yes." They went South. There the woman contracted pneumonia and died. Her daughter telegraphed her husband: "Mother died last night. Shall I cremate or bury?" He telegraphed back: "Cremate *and* bury, both — take no chances."

That would be what I would do with our ballot law. I would make it so strong as to take no chances with reference to what should be the accuracy and secrecy of the operation of it.

Another point: We ought to agree upon the necessity of the elimination of the use of money from politics. In Connecticut, the farmer, or at least I may say "the little townsman," which is practically the same thing, is the ruler of our destinies, and he can play a larger part in the elimination of the use of money from our elections than any other individual in the entire community. Now, in referring to the last election — and I do not for a moment wish to be understood as stating that this large amount of money which was used was corruptly used in each and every instance, because I do not personally know of an instance where money was corruptly used; yet it must be to the everlasting disgrace, if not the scandal, of the State of Connecticut that by the sworn returns offered by candidates for office in this little State over \$100,000 should have been considered necessary to carry out the purpose of the electorate. Those who are familiar, or in part familiar, with the methods of the political machinery, not machine, but machinery, know that where our candidates are called upon to swear to the expenditure of \$100,000 we are reasonably safe in assuming that \$50,000 was the sum in excess of which the actual necessary expenses amounted to. I personally believe it was more. Now, any system of election which leaves it possible for candidates to spend that amount of money in an election for offices of the State, if it is not corrupt in practice it is certainly vicious in principle. We may differ as to that, but we cannot differ with regard to the proper amount of money that an election should require. I suppose this statement may surprise you. It is a fact that in 1898, in this State, owing, it is true, largely to the lack of enthusiastic support and the consequent falling off in contributions, but it is nevertheless a fact that it cost but a

few cents over \$2,000 to carry out the entire desires and needs of the Democratic machine. As I say, there was a lack of enthusiasm and a lack of zeal on the part of some men in the support of their ticket, but the mere statement of that fact is extremely suggestive as to what the actual necessities are. I am not speaking from a partisan view, but I have had it from the chairman of the party of that year that for \$2,000 he was able to carry out and do all that the law contemplated in that election, for the State and the congressional offices. Now, it seems to me that we ought to agree, you men from the farm and we men from the city, that there can and should be some practical way or method devised by which we can eliminate the expenditure of money and make the unreasonable use of it more and more dangerous, and less and less necessary.

There is one more thing that I consider essential, but I very much fear all of you will not consider it so. I speak of it with complete respect for what I understand to be the view of many of you, and with a modest confidence in the soundness of my own view. I refer to the principle of "equality before the law," and equal and exact representation in government. Now, I am not going to make an address upon the subject of constitutional reform, although I am perfectly sure that such missionary service could be instituted in the State of Connecticut with very great profit to the State, but with no greater profit than to those who are farmers, and on that account occupying the small towns of the State. It sometimes seems that a strict construction of a principle of government is a thing of very small moment. That, however, is a fallacious idea. We cannot compromise with it, because the result of its application in a particular case is disappointing. Nothing is more important than that the people of Connecticut, or any other State or any country, should, with respect to principles of government, view their neighbors as equal with themselves before the law and in the halls of legislation. The slightest modification of that is a matter of serious import; is a matter of selfish principle. It is a serious matter, but there is reason to believe that this matter, which for all these years has been clouded, compromised with, and embarrassed by partisan consideration, can be so placed before the people of Connecticut as to call forth from them a

respectful hearing for a proposition to re-establish — if I may use that term — a principle of government which is vital to the welfare of every man in the State. You men may think in your small towns that you can live without reference to those in the larger towns; the people in the larger towns may think that they can live without reference to the welfare of those in the smaller towns; but that is an absolutely fallacious idea. No man in the town of Union can disturb the operation of the material law of democratic government, or cast a ballot which is an outrage upon the principle I have in mind, without it having an evil effect upon other communities in our State, upon the larger cities, upon cities of the size of New Haven. Our citizenship, no matter where it may be located, is interdependent. If I had the power or eloquence to arouse this State to an understanding or an appreciation of the fact of the interdependence of its citizens, no matter where they may hail from, I should feel that a service had been performed for Connecticut which every man, when once he realized its import, would thank me for. I hope the opportunity will be presented before many weeks, in your own towns and by your own firesides, removed from the prejudice and passion of elections, into which so many elements enter, for the careful consideration of this subject, and that the time will come when you can feel that you are the beneficiaries, and the smaller the town the greater the beneficiary, in the re-establishment of a fundamental principle of democratic government.

Another thing we can agree upon, and it is something which is in your hands. We who live in the large centers of population exert but a small influence upon the government of the people of the State. We have perhaps larger circulating newspapers, and we have perhaps a more perfect opportunity for discussion and exchange of views, but we have not the physical power that you have to accomplish results. There ought to be in the State of Connecticut a corrupt practice act. It is always humiliating to the individual to feel that his fellow mortals as a whole, and in which he must of necessity include himself, are so prone to evil that it is necessary to have laws to keep them reasonably good; but experience has shown that there must be laws to limit the dishonesty of one's fellows and to prevent the manifestation of

their weaknesses. There can be a law passed in this State, such a law as already exists in the State of Massachusetts, by which men shall be made to feel and to know that they cannot do, with reference to the electorate, what they please with their own money, because they own that money and are willing to spend it. There is a practical way of reaching them. It is not so complicated as it seems. It always seems complicated to the man who is perfectly willing to enter politics with an open purse. It has always been repulsive to him that his particular methods and ideas to obtain political preferment should be restricted by law, but it is not complicated to the man who takes a serious and upright and patriotic view of the duty which he owes his State and its people. It is a perfectly simple contention that a man's power and might for evil shall not be abused; that where it might be exerted for good it shall not be exerted for bad.

There is no reason in the world why any man in this audience should be denied the right to run for office. It should be the pride of every man in this audience to respond quickly to any call that his fellow citizens make upon him to serve them and the State in a given capacity, and yet from the condition to-day in Connecticut it is to a large extent impossible for a man of limited means to so respond. I mean limited means in the sense in which it embarrasses him to accept such office. It makes me, as a loyal citizen of Connecticut, blush with shame when I think of the treatment that we have for years given our Governors; men of great dignity and men of honest intent and splendid achievement, as a rule, asking them, up to sixteen years ago, to serve their State for the pitiful sum of \$2,000 a year, which I happen to know is hardly sufficient to pay their railroad fares and their hotel bills, when called upon to serve their people as the representative of the State of Connecticut. We would all feel humiliated if we were to find our Governors riding on a free pass. We ought to make it possible to have the benefit of the service and advice and counsel of the very best men we have in Connecticut in that office. That to-day is practically impossible, but when we get them we ought to thank God that through the goodness of fortune we have been so favored.

Now, one more thing. You men from the towns have the power. You are the ones who must do it, if it is to be

done. We all agree, I think, upon the broad position that the legislation for the State and its people should be along general lines. Unfortunately the contrary has been too much the policy in Connecticut. While our legislative body has legislated along various lines, in almost ninety-nine cases out of a hundred it has acted upon special lines. I think we can agree that this ought not to be so. For example: We have our city charters. The theory upon which our State government has acted has been that the cities were the creatures of the legislature. Our government has allowed each city, through its representatives, to run up to the General Assembly and ask for amendments and for special charters with reference to some particular idea of government which a little group of politicians in that city think is the best thing for their people. That has been the condition of things for years before our General Assembly, and the consequence is that the cities are constantly knocking at the doors of the General Assembly for special amendments and special charters, no two of which represent the same principle of government. We find our steam railroads and our electric roads working under the same old principle of special rights and special privileges, when, as a matter of fact, all that legislation, in my judgment at least, ought to be taken out of the hands of the General Assembly and, so far as possible, transacted by authority of general acts. It would properly come more under the head of general legislation, and if that was done we would not need to fear temptation to our legislators, or corruption, when these special things are wanted, and the interests asking for these special privileges would not feel the necessity of adopting corrupt practices in order to carry on a perfectly legitimate business, or a perfectly legitimate pursuit.

One thing more in that line. It is a matter which is not in force in this State, but it has been arrived at and made apparently satisfactory in the State of Wisconsin. Every man in a township, or farmer, can exert a greater influence in this regard than any other citizen in our community. We haven't yet quite reached the point, but we are doing so rapidly, where we have got to have some form of direct nomination for official places. Some form of direct nomination must be established whereby the pleas of party, and whereby the personality of candidates, shall be taken out of the hands of political

machines and put in the hands of the people themselves, where it belongs, put where they can nominate directly, as they now nominate delegates; put where they can do that as directly as they now act at the polls. That, to my mind, is one of the coming issues or principles which the American people will seize upon.

Now, those six things are things upon which the men from the farm can agree with the men from the city. I am one of those who take a very hopeful view of the future, and I look for a substantial advance in our political matters along these lines. It seems to me that the State of Connecticut — and if you will allow me to say so, I believe her present condition is very largely the result of the wise and discreet counsel of Governor Lounsbury — the State of Connecticut to-day is in a better condition financially, and industrially, and in other ways which make for more prosperous living, than it has been, perhaps ever. The material conditions and the political conditions are favorable. The same can be said, I think, of the nation. The conditions seem to promise a remarkable commercial development. These things being so, there suggests itself the necessity for hemming in these conditions by laws and by resolutions which shall enable us to enjoy them to the utmost. With reference to the idea which I constantly want to leave with you, of harmony and coöperation between the men of the farms and the men of the city, or the men of the farms and the operatives in the factory, the men on the farms and the operatives in the factory, wherever they may be, are all practically the same type of men and have the same hopes and the same aspirations. They are all human beings, having the same interests in good government. They do not all grasp the same idea, perhaps, or act from the same point of view, but they are all of equal weight in the electorate.

Whether we are sticking quite as closely as we ought to fundamental principles of government remains largely a matter of opinion, but there can be no difference of opinion with reference to the fact that the closer we stick to the strict construction of the fundamental law, the safer we are and the nearer we will come to the realization of our ideals. We need not more, but less government in this country. If there was ever a country on the face of the earth, if there was ever a

State more advantageously placed than this country or this State at this particular time, I am not aware of it. But our heritage is to be guarded with strict watchfulness. The large number of bills which come in at each session of Congress shows a restlessness of spirit and an ignorance of the constitution that is appalling, and it is only a lack of time, combined with the great common honesty of the average American legislature, that saves us from the deluge and enables us to get out of things as well as we do.

I think there is a good deal to be said upon the subject, especially with reference to this particular phase of it. A great deal has been said about the conditions existing, and it is sometimes said that a hatred and narrowness exists. True it exists, and that is appalling. The hope of the future, it seems to me, lies in putting a little higher valuation upon the character of a man and a little less valuation upon his money. It has been treated from every point of view within the past few years. It has sometimes been treated from a surprising point of view with reference to the Philippines and our absorption or assimilation of those islands. All these things are indicative of a deeper national feeling. It is not a question of affiliation, it is a question of education, and just where you will learn to discriminate between what the rights of man are, and the rights of what a man has are, is the problem. When we solve that question and reach a correct solution we shall come pretty near the millennium. The great difficulty has been that there has been too little thinking done, but one of the hopeful signs of the future is that there will be more thinking done.

A great difficulty has grown up through our system of caucuses and conventions. They are run by those who think when they want to think. That will be corrected by the people learning to think. We have had a remarkable illustration of the advance which has been made in that line in the last four years, and I assure you I speak without partisan interest, for I would not attempt to do that before an audience of this character, but we have had a remarkably suggestive illustration of the force of that within the last four years. We have had two remarkable elections. Whether you think the proper man was elected or not has nothing to do with the fact that this great country met great issues and

settled them beyond any hope of their revival or resurrection. Now, the reason of that, and that is what I want to impress upon you, is that there has been at work in this country for a quarter of a century two tremendous forces which are not, I think, fully appreciated. One proceeds from the American public school system and the other proceeds from the interest of individuals in public affairs. In other words, the people are being awakened. The people are commencing to think. The plain people are learning to think. We have often heard the plain people spoken of in terms of contempt, but the plain people have learned to think, and the common people of the twentieth century will be a people with better opportunities and wider opportunities of educating themselves. That is an exceedingly hopeful sign. Men who not only think, but who dare to think — those are the men the people will follow, and they will follow them to a successful and prosperous condition.

Now, I have only one or two things more to say, and it is perhaps a repetition of what I have said before; but I would appeal to you men from the farms, and you look just exactly like the rest of us. I appeal to you and ask you people from the farms to regard yourselves as citizens of Connecticut. Pardon me if I assume that you have not always done it. I appeal to you as citizens of Connecticut, and not citizens of your towns alone. I would advise you and ask you to be loyal and true to the interests of your towns, but your loyalty to your towns ends at the borders of them. When you begin to regard your duty or your responsibility with reference to other towns, then you will not have exactly the same feeling that you have with reference to the duty you owe your neighbor who lives within a quarter of a mile or a mile distant from your farm. There can be in Connecticut no wise legislation built upon experience and sound judgment, there can be no such legislation, except through a trained representative class, whose breadth of view is broad and patriotism is great. When you regard other towns as you do your immediate neighbor, then you are acting the part of a good citizen of the State.

Connecticut is a small State; it is a prosperous State, and there are indications of a greater prosperity than ever. We must prepare ourselves for a great future. Then why should we as citizens bother our heads and waste our time fighting

over small things, and why should there be any more disagreement over what are palpably common interests between you men of the farms and we who dwell in the cities? Why should we not pull together regarding what is to be done, and do what should be done with reference to the welfare and prosperity of the proudest and sweetest and best State in the Union?

The PRESIDENT. The last speaker has stated that there were indications of an increased prosperity in this State. I believe it. I believe, as Colonel Osborn says, we must be prepared for it.

These sessions of the Board of Agriculture have been made much more pleasant because the ladies have been given a place upon the program. We haven't got through with them yet. We are going to let them close the whole program. It gives me great pleasure now to introduce Mrs. C. W. Pickett, who will give us a paper upon "Reminiscences of Farm Life."

REMINISCENCES OF FARM LIFE.

MRS. C. W. PICKETT, NEW HAVEN.

Mr. President, members of the State Board of Agriculture, and friends:

A New Haven woman once made this rather astonishing assertion to me: "You seem to be as proud of the fact that you were born in the country as I am of being town born;" to which I replied with some warmth, "You are right." And although not consulted on the subject, I was willing to be born in the place which had given to the world three college presidents,—Day, Wheaton, and Finney, a Horace Bushnell, a Senator Platt, and an Aunt Betsy Averill.

I had not lived in this city of my adoption many weeks before I discovered, as have other strangers, that one had almost better not have been born at all than not to have been born in New Haven, and, next to the place my parents selected, I should have chosen this abode of my second love.

While this phase of local pride is rather abnormally large in the City of Elms, there had better be too much of it than too little. I like people on every occasion to uphold their own town, city, or village, to believe in it, to champion it, to swear that there are neither malaria, mosquitoes, nor meanness within its borders.

The man who runs down his birthplace is the one who has little patriotism, and, I was going to add, principle. But that is rather severe.

The love of home is, however, the foundation of both these qualities, and "The Man Without a Country" who will shout for any flag under which he happens to be is the one who has no attachment for any particular spot on the face of the earth, and I always shiver when he comes my way.

There was never a Washington, a Lincoln, a Webster, or a McKinley without a Mt. Vernon mansion, an Illinois log cabin, a New Hampshire farmhouse, or a Canton homestead in the background.

With these places are closely associated the ones who lived there, and left behind in tradition and history the indestructible monuments of their words and deeds.

Apropos of McKinley and his loyalty to his old home, it was his niece who, while in New Haven at some of the Yale festivities within the year, was the partner of a student at a dance. It was their first meeting, and in the course of the conversation Miss McKinley chanced to inquire where Mr. H. lived. He replied, giving the name of an unimportant little Connecticut village, adding: "It isn't much of a place, but it's home, and I'm fond of it."

The President's niece answered: "I'm glad you love your home, and are not ashamed to speak up for it, however small and unimportant."

The young man told of the incident as showing that Miss McKinley was "the right sort of girl," but I thought when I heard it, as you do, that in the telling he, also, showed himself the right sort of a son, and that both of them revealed in those few sentences the kind of stuff they are made of.

After serving an apprenticeship of several years, I can perhaps claim to be a pretty thoroughly seasoned New Havener, as much so as one of alien blood can ever hope to be, and am as devoted to the city's interests, traditions, prides,

and puritanisms as another, but, while this is true, my heart ever turns with fondness to country folks and country ways.

It was, then, with deep appreciation of the honor that I accepted the invitation of your committee to take part in this program, and it is in a sense as one of you that I appear this evening. I realize the awfulness of my position, and if I have a criticism to offer of the program-makers of your convention, it is that they got it wrong end first, and started with their climax.

After listening for three days to such distinguished speakers as Mayor Driscoll of New Haven, President Hadley of Yale University, His Excellency Governor Lounsbury, ex-Governor William Hoard of Wisconsin, and other interesting speakers, and then at the last to find myself lined up with the Depew of New Haven, who has the reputation of arousing all the enthusiasm, exhausting all the laughter, and winning all the laurels, leaving only the dry bones of tolerance to the unfortunate victim who follows him, what is there left for me to say which will arouse an iota of relish in your already satisfied mental appetities?

Shall we then, as best we may, enjoy together a few reminiscences? They will be yours as well as mine, for they have, in one phase or another, entered into the life of every one here who has lived in the country, and if I touch them up a bit pray do not consider that it is in other than a spirit of pleasantry, for not one of you can have a more sensitive pride in all things pertaining to the country than have I.

And just a word about the rapidly vanishing country. As a matter of sentiment it is to be regretted. As a sign of progress, you who live remote from the cities are to be congratulated on the marvels electricity has wrought for you in the past few years, bridging the gap between rural and urban life, and making the villages the suburbs of the cities.

The old stage coach is every year superseded more and more by the trolley car, the "Come and spend the afternoon and stay to supper" method of entertaining friends has given way to five-o'clock teas and evening functions. The old-fashionable wedding with its eight kinds of cake, gold, silver, chocolate, cocoanut, black, citron, pound and raised cake, is relegated to the past, and now a caterer runs out to your door with his lady fingers and frappé; a florist and an orchestra

go with him, and there you are, just as conventional and up-to-date as city folks.

The benefit of these innovations is reactive. The resident of the country is brought in touch with the advantages of the city, and the dweller among brick walls can leave his desk after the business of the day is done, and in a half hour be out where things are growing, the air is fresher, and life is lived nearer to nature's heart.

There are still places hidden among the Connecticut hills which have thus far failed to be gathered to the heart of any of the benevolent corporations which are throwing out these connecting lines, but the spirit of the times is progress, and none will escape the tie which is binding fast the city and the country.

There are few living so wedded to the things that were, but will eagerly welcome the opportunity of becoming a prey to the gigantic spider which is throwing out the strands of its web in every direction and bringing in all the flies, big and little, which lie in its pathway.

I would the old lady were still living who, on that great day when a little steamboat was launched on the lake in an inland village, exclaimed with gratitude: "I have always hoped I should live to see the day when this should become a seaport town." She was one of those energetic spirits who are not content to follow the band wagon, but want to ride and bang the drum. Such a pity she could not have lived in the age of electricity.

While preferring the trolley car to the stage coach as a method of transport, I shall, nevertheless, regret the final disappearance of that old vehicle. At the age of ten the way out into the world was by that old stage. Into it went friends, brother, sister, uncles and aunts, to emerge in China, California, at school, at Yale College, it mattered not where, the stage, to my mind, was largely responsible for the revolution their departure made. Some of them never came back.

Stage-coach incidents of an amusing nature, if brought together, would fill a library with volumes of encyclopedic dimensions. Among the variety which have come under personal observation was one last June. He was a New Yorker, prospecting for summer board. She was prospecting for summer boarders.

He was, in appearance, well fed, well groomed, and prosperous. She was a born, bred, dyed-in-the-wool country woman with a keen mother wit; a match at every turn for the worldly wisdom of the stranger at her side.

He was talkative, and "let on" as to his errand in the country thus early in the season. He had a place in view, but was not committed, therefore, she had no scruples in exploiting the superiority of her place over the others.

She was getting along famously until he inquired how far her house was from the water! On learning that it was a mile, but a short one, the stranger expressed the fear that the distance would not suit his daughter, a fine oarswoman. To this demur the good woman replied: "If it is water you are looking for I have a son-in-law who has a large hotel on the Sound which would suit you, I am sure."

Again the New Yorker betrayed interest, asked numberless questions about the shore place, but finally ending with the unpromising remark: "That would be all right for the girls, but as for me, give me the country. For myself, I'd like nothing better than to spend the summer on a farm."

"Now," at last, the other passengers reflected, "the stranger scores, for surely this clever woman cannot have a farm up her sleeve also." But, listen: "Well, if it's a farm you are after, I have just the one you want: fifty acres of land, house all furnished, sixteen young cattle on the place, and you can see all over two counties from the back door."

"Now, I am interested," quoth the stranger. "Say, Dick, do you hear that?"—addressing his friend, an absorbed listener all the time. "My friend, here," speaking of his seat mate, "has nothing but money, and he'll buy your farm for a plaything, and I'll play with it this summer."

"How about the water supply? Nice old-fashioned well sweep? I like good water myself, but Dick doesn't. Isn't a brewery on the place, is there?"

Some one whispered: "Stranger's ahead this time," but he whispered too soon, for the stout woman was already saying, with a ring of triumph in her voice, "No, there is not a brewery on the farm, but there's a distillery a half a mile away; won't that do?"

The stranger surrendered. "You are the best advertising medium I ever came across, and I've been in business in New

York for forty years. I'll board with you, my daughters shall go to the shore hotel, and Dick shall buy the farm."

Among other and earlier instances in which native wit got the better of worldly experience two stand out with vividness. "The store" figures in both, though not the same one. The proprietors of both were of the old-fashioned variety, who are becoming obsolete, as are many other time-honored institutions of the country.

Like all of his kind this one did not think much of new-fangled notions, nor "city airs," as he termed any great access of politeness in manner or speech.

A city gentleman, the kind who cuts a swath when he goes away on his two weeks' vacation in the summer, you know, entered the store and, with his most superior manner, asked to be shown some "hose." The character on the cracker barrel rolled something from one side of his mouth to the other, and then slowly answered: "Hain't got no hose, young feller, but I've got some first-rate tater hooks." Exit "Young Feller."

The second instance also occurred in those days which I am recalling, and, by the way, it requires some courage for a woman to get up in public and give reminiscences, — for the word suggests decades and scores of years. But the definition — I look it up, just to see how much of a give-away this subject would be — is a recollection, a memory, may be yesterday, or last year; the term is as broad as that phantom-like, moveable period which separates young-ladyhood from that unnameable state beyond.

This one is a family joke, but the one it is "on" is too far away to mete out immediate retribution. When a young man left his home and went West or to the city to seek his fortune, his first visit home was an important event. If he wore a silk hat it was received as a sign of prosperity — or foppishness — by the elders, and as a mark of distinction by the girls.

It was to the West that the one brother of the family went, at the age of eighteen, and I am sure you will be glad to hear that at the end of a year and a half he came home for a visit, and sported the traditional silk hat. We girls thought he looked just lovely in that hat, and insisted with more fervor than judgment on his wearing it on every occasion, which contained a hint of the social act.

One beautiful August afternoon we all rode to a neighboring town to call on relatives. It was a place famous in history for its mammoth blackberries, and the mother, with characteristic foresight, stowed a tin pail in the wagon, with instructions to bring home some fresh berries.

On the return drive we drew up to one of the aforesaid stores, and with a proprietor even more celebrated than the other for his quaint originality and intolerance of city airs. Needless to say, the top hat was along.

The old man sat on the stoop; not verandah, nor piazza, but just plain "stoop." Respectfully the wearer of the tile inquired of the storekeeper if he had berries for sale. After the usual deliberate pause, with which these "types" always precede their remarks, he replied: "If you want some blackberries, go pick 'em, and use your hat for a pail."

A highly incensed group drove away, leaving the old man chuckling over the way he had taken down that "city chap." At the time we thought it a very bad joke. As a reminiscence it wears well.

The country has ever been a prolific subject for the poet and prose writer, and certainly in its natural beauties the muse has sufficient inspiration. The farmer whose duties, if he be an active, successful one, compel him to arise with the lark, has rich compensation for the loss of an hour or two more sleep, by the numberless beauties which the world unfolds for him and his followers alone.

Even in the city the world at five o'clock on a summer's morning (I saw it once) has charms of which the late riser knows nothing. It is the milkman's hour and he earns the exclusive privilege he enjoys.

But in the country the inhabitants of a farmhouse of any size must be astir at that or an earlier hour, and it is then that nature, like the thrifty goddess she is, is already up scattering with a lavish hand her favors on all who do her homage by greeting her as the "Coy Maid of the Morn."

I think of all I am missing every pleasant summer morning when, after your thirty or forty cows are milked, your breakfast eaten — and with such keen appetites — the average hour in the city comes and with it no landscape view to see, no "dew on the gowan lying," no purple shadows lifting on the hills, no mists rising from the valley, no meadows

lush with verdure, no gradual displacement of dawn by the full glory of the morning. Yes, I think of all I am missing, and then take another nap.

Strict honesty compels the confession that five A. M. was never a favorite rising hour, and if the truth were known, as seldom indulged in as a favoring god and an indulgent mother would allow.

But, all the same, I thoroughly believe there never is a world so beautiful as that which dies each day while lazy humanity slumbers.

If the farmer has compensations in his daily labors which the city business man must do without, so does the farmer's wife. She bakes and brews to the musical accompaniment of birds and bees, her brow fanned by fresh breezes blowing in from the daisy starred meadows. The scent of the lilacs, clover, new mown hay, and all the delicious unnameable odors of the country in summer time mingle their fragrance with that delicious custard pie she is making, and therein lies the difference between country-bred custard pies and those of town origin.

What does she know of the absolute unattractiveness of cooking a dinner with grocery eggs, vegetables that she would have thrown away yesterday as stale, chickens whose pedigree is unknown and the date of their death a myth? And this, too, in a kitchen perhaps in the basement or, at best, looking into a six by ten back yard, with a meagre patch of sky overhead and an ashbin and four clothes line posts as a landscape view.

No wonder we leave the kitchen to those who can't escape and wander off into other fields, reading papers and things. But a farmhouse kitchen, with its sunny south windows and its "view all over two counties," is the most fascinating room in the house and the place of all others I love to visit.

Again, she has another advantage over her city sisters, for if she have fewer diversions she enjoys them with keener zest. What matters it how elaborate the feast if the appetite is missing? She anticipates what pleasures she has and realizes all she anticipates and never suffers that foe to youth and health — ennui.

I have sometimes feared that my orthodoxy as a farmer's daughter might be questioned, for I never milked a cow nor

raised chickens for the market. I did engage in Maud Müller's occupation on several occasions and believe I attended to business as strictly as did she.

There was another duty which was less attractive than Maud's method of farming, and that was raking leaves in the fall. A large yard, containing great trees, some of them of a century's growth, is a beautiful thing to have in the memory and to long and pine for when the thermometer is up in the nineties, and still aspiring, but it has its drawbacks if you happen to belong to a committee of four to keep ahead of the daily hurricane of leaves that come swirling down with every gust of October wind.

As though our own supply was not enough, we had contributions from our neighbor's trees and the wind was always in our direction. It was small consolation to our youthful band that those from across the street were leaves of history, wafted from trees set out forty or fifty years before by Horace Bushnell, author, philosopher, and noted divine.

Even yet I cannot see loose leaves on lawn or walk but the early habit asserts itself, and instinctively I look around for a rake. And this suggests at once the difference in the method of rearing children in the city and the country, largely due to the difference in environment.

There is little in the city for a boy, especially, to do. Even the kindling wood is brought to the door in bundles ready for use. But in the latter place there is no limit to the tasks the sons and daughters can perform to help in the general comfort and prosperity of the family. Who can blame the lad of fourteen if splitting wood out of doors, with an apple tree or grape vine near at hand, is an easy thing, when if he has to do it in the cellar of a city residence it becomes a hated task?

It is then impossible, for many reasons, that the city-raised boy or girl should receive the same kind of training that his country cousins do. It is the sturdy schooling the latter receives which largely explains the great number of eminent men and women who are traced back to rural homes. The coming generation will see, I fear, a lessening proportion of strong personalities coming out of the country, for the trend of young men has been steadily cityward in recent years.

Life is lived along different lines to-day; wants have in-

creased, living is more elaborate and complex, and the contagious hustle of the masses is drawing the sons from the more quiet life of the farm to the centers of activity.

This fact, viewed pessimistically, would occasion intense anxiety for the future, but imbued with a hopeful belief that the progress of the world is steadily onward, as it has ever been, what seems at first thought a deplorable change for the worse may be the very best possible thing for the future, bringing, as it will, in a greater degree than ever before the bone and muscle, energy and endurance of the country into the mercantile, professional, and scholarly pursuits of the city.

There may be, doubtless will be, less striking personalities and types in the coming century than in the one just drawing to a close. The self-made man will be a *rara avis* in the coming generation. Educational advantages are too general and too free to everyone to admit of the possibility of self-education by the light of the backlog. There will be less difficulties to overcome and consequently a less sturdy struggle to conquer. But while there will be fewer Websters, Greeleys, Huntingtons, Vanderbilts, Wanamakers, Danas, and Dwights standing out with stellar brightness against a background of mediocrity, the whole standard of men and women, of education and achievement, will be raised, making the contrasts less startling.

It is always a question when witnessing a play which is the better, to have one star and a poor support, or an all-around good company? Personally, I like the latter plan, as giving more satisfaction and also furnishing an opportunity to those who have worked just as hard as the star to win recognition of their efforts.

No, there will be no more N. D. Sperrys walking in from a Woodbridge farm with all their worldly wealth tied up in their pocket handkerchief, but there will be kinsmen who will, with a touch of pardonable pride, relate the fact and also remind their hearers that Mr. Sperry was elected four times to represent his district in Congress by men who appreciated sterling honesty, even as their forefathers did, more than the finer training a collegiate education gives, unless coupled with this virtue.

The men of Connecticut who follow in the footsteps of this

type of public officials will have illustrious examples of truth and integrity to emulate, and these qualities, united with an education such as Yale University furnishes, should make future politicians a fine product of the twentieth century, else must we deplore the days that are gone, when men knew less of grammar than of morals and more of telling the truth than of diplomacy and finesse.

But just in passing, do you not suppose that Congressman Sperry finds his modern dress suit case more convenient than the one he used on his first journey out into the world?

The bandanna handkerchief traveling satchel is an awfully nice thing to have in the family history, but we all of us know that we are glad we live in the age of leather ones. Yes, we are proud of that type of our ancestors and we have a right to be. We trace to its very self-denial, staunchness, and stick-to-it-iveness whatever small success we have attained in life.

We were taught not to be afraid of work, and we are glad, else we should have hated ourselves most of our life. Other advantages of that early training were these: Take things as you find them, eat what is set before you or go without. Now, it isn't always pleasant when you want frosted cake to be told you can have bread and butter, and if you can't eat that you are not very hungry, but you who heard that same decree in the days that are not, have seen the time since when you have thanked your stars for that early bread-and-butter-when-you-wanted-cake schooling.

The simile serves to illustrate a certain hardihood or endurance of things as they are, which the majority of children in country homes are taught as a part of their bringing up. Not that indulgence and tenderness are missing, but I am convinced by personal observation that there is less of the spoiling process followed by parents in the country than in the city—even now when the relations between parents and children have undergone an immense relaxation in both places.

Again, the physical benefits derived from living one's early life in the country are a part of one's stock in trade. It's the foundation which tells, whether in a building or a human being; and the free, vigorous, outdoor existence the average child in the country follows, will impart vigor which will last him for many a year of life in town.

Going to bed and getting up in the morning in the northwest chamber with the thermometer below zero, and the wood-stove, sacred to Sundays and parties, as cold as yourself, is a more delightful reminiscence than reality, but it taught its lesson — not to be too thin-skinned and stay indoors at a sudden drop in the temperature.

It is a good thing not to be afraid of the weather, especially if one's lot is cast in New Haven. Many of those same northwest rooms now boast steam or hot water heat, and the first time I entered one of them after the innovation I felt a kind of mental disturbance, as though a certain symmetry or harmony had been vandalized.

In the morning, however, a bitter one, I became reconciled to the change.

If I were to name what I consider one of the greatest and most lasting advantages of having lived my earlier life in the country I should without hesitation say this: the recollection which remains of the quaint and original types of men and women left over from a former generation, and which mark the dividing line between the old school and the new. Of these old school types but few remain, but their individuality stands out like silhouettes against the background of memory.

Will you take a glance into my picture gallery, and see if you recognize any of the portraits. Who is this pious woman with her curls, her meeting seed, and her sanctimonious air? She looked on the world as a vale of tears, to be passed dismally and prayerfully through. It was part of her duty in life to talk to every young person she met on the subject of religion, until finally, objecting to being converted every day in the week, we dreadful girls would run out of the back door as she came in the front, or turn convenient corners just in time. Her memory brings to mind judgment days and funerals, two potent arguments she used to turn sinners from the errors of their ways, but I cannot spare her from my album.

Here is Aunt Fanny: everybody's Aunt Fannie, you know, with her queer little old maid ways. She walked through the streets talking fast to herself, and then entering a neighbor's house, would sit the entire afternoon without speaking a half dozen times. She would take off her bonnet and shawl, and

settle herself with her knitting, which meant that she would spend the afternoon, and take tea. She made the rounds of the village regularly, and everyone knew and respected her eccentricities. She put a quarter into the contribution box, and asked for twenty cents change. She had more invitations to Thanksgiving dinners than any other person in town, because she had nowhere else to go, which is paradoxical, but true. She had the largest and pleasantest funeral the village had enjoyed for years; a conclusive and recognized test of one's standing in a community.

There are so many I hardly know which to choose, and will pick them at random. This silky, light-haired woman was as neat and economical as she looks. An irreverent grand-nephew dubbed her "Aunt Specked Apples," because she never gave away an apple without the inevitable decayed spot. This same incorrigible boy insisted that if she went down cellar to get some apples, and there were none with the economical speck on them, she would stay there until it appeared. She was a manager. She would fuss around warning everyone to be careful going through the newly-painted gate, and then go through herself, and ruin her best black alpaca, which really showed her abnegation of self. She took care of her husband so thoroughly that he finally died of overmuch attention. She never for one instance relaxed her vigilance over her relatives and neighbors, and with her last conscious breath she asked her son, a married man with six children, if he had on his rubbers.

This old gentleman, with a high stock and sparse gray hair, was eighty-six when he died from a paralytic stroke, but up to the time he suffered the first stroke he rode horseback, walked up and down the mile-long hill to his house, and his last great work was the clearing of land for building lots on the shore of the lake. He was offered large sums for lots, and then went straight up on his price. He would not have sold a foot of it for a thousand dollars, and everyone knew it but him. He was a deacon in the old stone church across the green for fifty years, as his father had been before him, and he was rarely absent from his pew. He was always on time, generally ahead, and once a great deal ahead. He mistook Saturday for Sunday, and made ready for church, sat down, and waited for the first stroke of the bell, his signal for starting. Hear-

ing unwonted noises about the house in place of the usual Sabbath quiet, he came out of his room to call things to order, and discovered he was twenty-four hours too soon. He cracked the same April Fool joke for a half century, and his family and neighbors laughed with him as heartily as though it were a new one each time.

It would have been a foolhardy individual who would have intimated to the deacon that there were moss and barnacles on it, for he and his joke were respected of men, and they would have defended both with their lives. He was breaking a colt at the time he was stricken down. After he had recovered somewhat, his chief concern was about that colt, and who would exercise it, "for," said he, "no one can manage him but me." He finally begged so hard to be lifted out of bed and allowed to try his strength that it was done just to satisfy him. After trying in vain to stand without support, he surrendered, and I'll never forget the look of defeat on his face as he said: "You are right. I can't walk, and I guess my day is over, but who is going to drive that colt is more than I can make out."

Yes, they were grit clear through, those men and women of a couple of generations ago, and some of it was passed along to their descendants, as later history has proved.

And here is one with her calm, sweet face and cheerful disposition. There were no "blue days" in her life, no time for any, and yet she was never hurried. Work melted before her deft fingers like dew before the sun. She was always "just through" doing things. She never seemed to have any beginnings, which are stupid things at best. If a neighbor called at an unusual hour, she was just through baking, or ironing, or changing her dress, and just going to sit down. She was a good neighbor, and willing to lend things, which makes for popularity in the country, where company comes unexpectedly for dinner, and the store a mile away.

She was a financier, and would take \$25, go to the nearest town to fit out a family of six, bring home fifty dollars worth of materials, and, in a month's time, turn out one hundred dollars worth of frocks, hats, et cetera. Two or three yards of tarlatan, a scrap of velvet, a bit of lace, and an artificial flower meant in her hands a dainty party frock, and more of it than the city modiste accomplishes with a carte blanche order for material.

She would take a worn-out gown, turn it upside down, inside out, piece it up, piece it down, retrim it, remodel it, and hand it over to one of the girls as good as new, and lots cheaper. Cloth grew under her fingers, and no man knew from whence it came. In her work basket was a thimble, pricked full of holes in loving service to her family, wrought during long afternoons and evenings after the household duties were done.

Her children had a supreme faith in her genius, and were proud to own it on occasion. For instance, on an early June day, one of them was with a group of girls when the all-important topic of new summer hats was under discussion. Each was telling what she expected to have. The vainest and best dressed girl had just completed an elaborate description of a hat which would hit the twelve dollar mark; then turned to this daughter, and with rather of a superior air, asked: "What are you going to have?" and the girl replied, with a possible hint of wickedness in her voice: "I don't know. Mother hasn't been up garret yet."

This mother was a politician, too, and there never was a president's message so long or so dry that she did not read every word of it. She kept pace with the times, and no current topic was ever broached that found her unprepared. What she was in all these ways she also was in the church; always doing her part, and her best. A simple, uneventful life, marked by no great achievement, but as long as memory remains to those who knew her there will be many to "rise up and call her blessed." I hope you all have her portrait in your album.

Just two or three more, and we will close the leaves, but the exhibition would not be complete without them. An old gentleman, stern, grizzled, uncompromising. He wore the swallow-tail coat in which he was married to his first wife fifty years before, and at two later matrimonial ventures, to church, and on festive occasions. The nearest approach to frivolity, I suspect, he ever ventured was when his youngest son was taking a party of young people for a sleigh ride and a supper to a town twenty miles away. We earned our pleasures, and enjoyed them accordingly.

We passed his house just at dusk already on the way. As we neared the place we saw his gaunt form standing at the

gate, and as we dashed up he lifted a tiny flag, and waved it like this — just twice. Then, without a word or smile, turned and went toward the house. I have always wondered if his conscience acquitted him of the unwonted levity.

I could part with many of them rather than the old school teacher who taught two generations of mothers and daughters, fathers and sons. I surmise there are some here who received the instruction in Latin, Grammar, and Shakespeare he imparted so cleverly, his method original as his learning was self-mastered.

Shakespeare was with him a passion. It was used as a reading book and in the grammar lessons. We analyzed and parsed Desdemona's death struggle, and reduced to parts of speech, moods and tenses Hamlet's Soliloquy. Nor was this all. On Friday afternoons we put to every sort of torture, over and over again, fair Ophelia, outspoken Cordelia, romantic Juliet, noble Queen Katherine, gay martial Rosalind, unscrupulous Cleopatra, and all the rest of the fascinating group.

It was a common occurrence to see a slip of a girl in short dresses inspiring Macbeth's courage to the "sticking place," the master, six feet two in his stockings, always assuming the part of Macbeth, and, indeed, all the leading rôles. Rulers took the place of daggers, sticks served as swords, and I doubt if any of his pupils ever became as excited when seeing Booth, Barrett, or Irving in later years as when their beloved master fought, raved, bled, and died on Friday afternoon.

Not one who attended the academy but has known his Shakespeare and *Paradise Lost* forward and backward ever since. He lived in a house just adapted to his individuality, descended in the family since 1750: the house in which Washington slept — pray, do not laugh. This is authentic, and the pet tradition of the town. It was at this house, then an inn, that Washington tarried over night with his staff. The news of Arnold's treason reached him there, and he was profoundly agitated by the tidings. He could eat none of the bountiful breakfast the landlady and her maids had prepared for their illustrious patrons, and while the men ate he paced the floor, taking nothing but a bowl of milk. As soon as the men arose from the table Washington gave the command

to mount, and the gay coated cavalcade dashed down the hill on its way to Poughkeepsie, leaving in its wake a pride and glory which should never fade, and be passed on from father to son for generations to come.

I have already mentioned the name of the last one I shall show. It is that of Aunt Betsy Averill, and although her death occurred as recently as 1891, she belonged to a day and generation long since become ancient history, for she lived to the great age of 104 years.

It was like delving into the tombs of a past age to converse with her, for she had lived through the administration of every president from Washington to Cleveland. She was a young lady when the former died in 1799. She was three years old when Franklin died; was forty-two when the first trial trip of a locomotive was made, and a year old when Byron was born, and he lived and wrote and died so long ago that he has, for scores of years, been a part of the annals of the past.

She outlived dynasties, saw revolutions come and go, kings and queens were born, reigned, and died, and still from her retired home on the hilltop she lived her quiet, useful life. She had a wonderful memory, a keen intellect, and her presence was a benediction to all who came near her, as it was to the place.

It is pleasant to relate that the old homestead is one of those likely to remain in the family, for there are now living, with their parents, six great-grandchildren of the venerable saint, and I would that this were true of more of these country places which are passing more frequently into alien hands than one cares to contemplate.

However, the audience to-night, largely representing, as it does, these old family homes, contains the comforting assurance that the worst is still a long way off, and that the fear that has sometimes been expressed as to the final extinction of the lineal descendants of the soil as owners of it is yet only a fear.

It was, I think, Edward Everett Hale who said: "There is no pride in the world so great, not even excepting the pride of the Brahmins, as that to be found in the country families who have lived on the same rock for several generations, and to be Mr. Brown of Brownville or Miss Jones of Jonesville is

a distinction neither would exchange for anything less than a diadem of royalty."

Mr. Hale did not greatly exaggerate the truth, and it is a good wholesome pride. Girls in the country never take along a chaperone to see that they behave. It is only necessary for the mother to say as they leave the house for a ride of fifteen or twenty miles to attend a party with their dress and "fixins" in a box: "Be a good girl, and remember that you are Miss Jones of Jonesville," and all is well.

As a last reminiscence and also a public confession of the largest and most unsuccessful enterprise in which I was ever engaged I shall confide to your keeping a dark secret. It has to do with the time when, with others, I was a railroad promoter. You have all heard of building railroads on air and water and bluff, but it was reserved for our little band to attempt one on — clams. Our village was switched off two or three miles to one side when the nearest railway line was built, and the problem then, as it is now, was how to catch on. There have been many schemes as unsuccessful as ours.

One eventful day a tallyho coach, drawn by four black horses, appeared in the town. There was an air of gayety and prosperity about the whole thing that made the intended impression, and when it was noised abroad that the owner had come to build that railroad we all fell down and worshiped. We dined and entertained that man or god, we subscribed our hats and frocks for two years ahead for ties and digging dirt. We gave our brothers, husbands, and fathers no peace of mind till they put down their names for more than they could afford. We held meetings, and the eloquence of the lyceum broke its bonds and soared as it never soared before.

The widow and her mite were there, and her touching message read aloud to the weeping, cheering throng. After a fortnight of this enthusiastic campaigning, eighteen thousand dollars of the necessary twenty had been raised, and every promising resource exhausted. How to make up that deficiency was the question, and the young men and maidens undertook to answer it.

Oh, blessed hopefulness of youth which never recognizes impossibilities and only sees in difficulties foes worthy of combat!

We would give a clambake, and such a clambake as never was, and we did. How we worked for two weeks more! We cleared up a grove, put up lampposts, and borrowed headlights from the railroad, for it was to be an all-day and all-night affair. We built six long tables, each to seat two hundred persons. We built a stone oven and it was a handsome one, a veritable work of art. We ordered clams, bluefish, and sweet potatoes, and a brass band from the nearest city, and these were the only things we expected to purchase. Everything else was to be donated. We knew our ground as far as pies, cakes, et cetera, were concerned. Then we got together the best driving rig in the group, put on our other dress, and started out to solicit.

Not a farmer within a radius of ten miles escaped, and not one refused to respond with the generosity we counted upon. Whole lambs, whole hams, chickens, bread, biscuit, butter, vegetables, fruits, jellies, pickles, all came our way for the asking, and promised ready to serve.

It was while coming home one day elated with success, which, as you know, is not good always for young folks, and sometimes for their elders, that one of our number had a brilliant thought. There was still an unworked source, where, if a miracle happened, a large donation would be the result. There was a woman twelve times a millionaire who had built a summer house far up the lake, had enclosed it, feudal fashion, with a great wall, but instead of a catapult to guard the massive gateway there was this magic sign: "Beware the Dogs!" The dogs were there, too; discriminating brutes, who would scan passersby with a critical survey and allow only those in carriages and their best clothes to enter the gateway.

They were not even the kind which the two tramps discovered, on approaching a farmhouse, which wagged its tail and likewise growled. Said one weary Willie to the other "Let's go in. He's all right; he's wagging his tail." And the other knight of the road replied: "Yes, but he's growling, too, and I don't know which end to trust."

Will we ever forget the tumult of our thoughts as we found ourselves inside the enchanted castle, actually ringing the bell and inquiring for the chatelaine? We will pass over the harrowing details. She did not want a railroad, not even

though it were three miles from her place. She might hear the whistle, she might actually see the smoke coming up the lake. She would give dollars to keep it away, rather than the cents to build it up, but as we had done her the honor of inviting her to the clambake she would buy two tickets. I shrink from confessing that we took her paltry two dollars, for we were refusing nothing.

The rest is painful, too. The clambake was a perfect success in point of numbers, pies and cakes, and sunshine and work, and all that, but those clams — they baked all day and they baked all night, and they never — no, never, got baked. Everyone knew later why they didn't, but it was too late. We were not quite inconsolable, for we had a goodly sum of money if the public did not have the clams. And you will never know until you have tried it how much clamor and clams it takes to make a thousand dollars. You have guessed the sequel. The man with the tallyho coach met with a financial failure soon after, but as he never had a penny of the money subscribed, I have always defended him against aspersions from the "I-told-you-so" fiend.

Our clambake-without-the-clams money went into the bank and stayed there for seven years, no one having a right to appropriate it to any other use until a special act of the legislature made it legal to turn it over to a new town hall.

There have been many subsequent attempts to build steam roads, trolley roads, any old kind of a road, but they never materialize, and the project is still open to promoters, who will always have my encouragement and my blessing.

It is said that the sound of the tomtom will stir the dormant savagery which lurks in the heart of every descendant of a heathen race, and make the wild blood in his veins respond tumultuously to its barbaric rhythm. Even so, I believe that the man or woman with a strain of country blood will feel a stirring in his heart in the spring time, however surrounded with conventionality and ceremony his life may be.

The tomtom of the country is calling us, the birds sing "Come home, we are nesting again," the tender leaves shooting forth woo us, "We are here again; come home, see, and admire;" the trout in the brook leap up in a reckless challenge. "Come back and catch us if you can. You tried and failed last year; we defy you again."

All the sweet sounds and odors of the country entice us. The old haunts and faces lure us, and we shall come; just at evening we shall come, at that mystic hour between dusk and dark, when the lamps are lighted one by one, and we shall watch through the undrawn curtains the supper tables already occupied or awaiting the family.

Longfellow surely got his inspiration from such a moment for his poem "The Day Is Done." What else could have suggested the couplet "I see the lights of the village gleam through the gathering mist"?

In the city, with the gas light the shades are drawn and the world excluded. In the country, the glow from the shaded lamp sends forth its welcome to the visitor, cheers the chance traveler on his way, and bids the homeless wanderer "Hope Again" as he knocks to ask for food and shelter.

One may have ridden miles over a strange country, uncertain of his direction, but if from the top of a hill he sees "the lights of the village" he spurs his jaded horse and mutters "I am on the right road," and the tired animal starts on at a brisker pace, as though he, too, had seen and understood that the distant lights meant for him food and rest, a stable and straw.

Just at night, life assumes a languor and quietude peculiar to the hour. The business of the day is over, and the gayety of the night not yet begun. It is the world's breathing spell. In the city, the business man leaves his desk and heaves a sigh of contentment as he boards his car and lazily glances over the evening paper. At home the wife has seen that the evening meal is ready to serve, and she, too, has relaxed a moment from the strain of the day's duties.

The children have come in from school or play and are idly stretched on floor or couch; all the world is waiting.

In the country, the farmer and his men are leaving the barn where the cattle are lowing in contentment as they munch their grain or hay. The house dog lies on the doorstep and barks without rising at the passing team, not with the vigor of the day nor of the moonlight hours, but lazily, for he, too, is tired and is waiting for the crumbs from his master's table.

In the house, supper is ready and the maid of all work waits the coming of the men before taking in the steaming

teapot which is sending forth its fragrant odors through the dimly lighted kitchen.

An hour or two passes, and the world arouses from its brief inertness and a new life begins, very different from that the daylight sees. Vice stalks forth with the darkness, and one may not reckon the horrors the night may witness. Some the dawn will disclose, others will remain unrevealed secrets of darkness.

Society dresses, dines, and, dances; the lover wooes; the gambler tries his luck again; the drunkard seeks his boon companions; the godly man his church; the domestic man his easy chair, and youth diversion according to its wont.

The day is done. Good night!

At the conclusion of Mrs. Pickett's address, Governor Hoard, in behalf of friends, presented Mrs. Pickett with two beautiful bunches of roses.

Mr. HINMAN. Mr. Chairman: I desire to offer the following resolution:

Resolved, That to the citizens of New Haven, among whom we have passed the last few days so pleasantly, that to the railroads that have so courteously aided us in making our meeting a success, to the press, and especially to the press of this city, for the thorough manner in which our friends who could not meet with us have been informed of our proceedings, and to those who have charmed us and enlivened our session with music, to the speakers of our last session, and especially to Mrs. C. W. Pickett, whose disinterested and untiring efforts have contributed so much to the success of this meeting, we tender our most sincere thanks.

I move the passage of the resolution.

Mr. AVERILL. I second that motion, and in doing so I believe I express the sentiments of the Board at this hour. I take great pleasure in seconding the motion which has been offered.

Mr. HINMAN. I think you can count on the fingers of one hand all those in this hall who have attended as many of

the annual gatherings held in years past under the auspices of the State Board of Agriculture as I have, and more than of any other man it has been assigned to me, and it has been my pleasant duty to introduce a resolution similar to the one before you, but never under exactly the same conditions has that been done before. It has been customary for us to thank our speakers, and those who have furnished our music, and those who have contributed to the success and pleasure of our meetings in previous years, but to-night those who have aided us, while our friends, are not farmers. Our claim to their assistance was simply an appeal to their generous good nature. Those who from day to day have enlivened us with music have been, although strangers, yet they came to us in the guise of guests, and to them our thanks are particularly due. In passing this resolution you will one and all realize that you are thanking these people for making to a great extent the Farmers' Convention at New Haven in 1900 one of the best that we ever had and one that will be long remembered. That, Mr. President and members of the convention, is what I desire to say.

Now, personally, after hearing Colonel Osborn, I want to thank him for the brave, true words he has spoken. That address that he has given us to-night ought to be for the glory of the whole State of Connecticut.

The PRESIDENT. All those in favor of the passage of the resolution please rise. It is unanimously passed.

Secretary GOLD. The convention will now stand adjourned sine die.

EXHIBITS AT NEW HAVEN,

December 11 to 13, 1900.

(Reported by N. S. Platt, Pomologist.)

Corn, Field — Seaman Mead, Greenwich.

Richard Griswold & Sons, Guilford.

R. S. Hinman, 3 varieties, Stevenson.

Simon Hunt, Columbia.

C. C. Palmer, Griswold, two samples R. I. Cap. seed from which both were grown, was procured from R. I. Ex. Station; one sample from seed procured in 1899 was small, and weighed for three ears 9 oz.; the other, from seed procured in 1858 and grown continuously for 42 years on same farm, was much larger, 3 ears weighing 24 oz.; types appeared the same.

Corn, Sweet — Geo. F. Platt & Son, Milford, Ne Plus Ultra.

Geo. F. Platt & Son, Milford, Evergreen.

A large display of garden seeds grown and exhibited by S. D. Woodruff & Sons, Orange, Conn., consisting of 10 or 12 varieties sweet corn, beans, peas, and smaller seeds in great variety, onions, several sorts, photos of crops growing in the fields, etc.

Apples — T. S. Gold, — varieties.

R. S. Hinman, Stevenson.

Albertus Plant, Branford.

Whitney Elliott, North Haven.

Simon Hunt, Columbia.

Butter — Mrs. Chas. N. Turner, North Haven.

Hubbard Squash — N. S. Platt, New Haven.

Sweet German Turnip — N. S. Platt, New Haven.

Samples of mechanical work in wood and iron, Connecticut Agricultural College.

Samples of grasses correctly named, Connecticut Agricultural College.

Samples of large one-year's growth of various trees, Connecticut Agricultural College.

Two cases of insects injurious to agriculture, Experiment Station, New Haven.

Three cases showing adulterations in food and drink, Experiment Station, New Haven.

Samples of peach trees and roots affected with crown gall, and a new trouble causing a spongy enlargement of wood and bark just under the ground, from Experiment Station, New Haven.

Bitter Hickory — N. S. Platt.

N. S. Platt.

Shagbark Hickory — H. S. Kirtland, Yalesville.

N. Dwight Platt, Milford.

Eli Hoyt, Bethel.

Henry S. Frost, Cheshire.

Dennis Fenn, Milford.

Chas. F. Palmer, Ridgebury.

M. T. Hatch, Bridgewater, 7 varieties.

N. S. Baldwin, Meriden.

Whitney Elliott, North Haven.

Native Chestnuts — N. S. Platt, 2 varieties.

Horse Chestnuts — N. S. Platt.

Black Oak Acorns — N. S. Platt.

Black Walnuts — M. T. Hatch, Bridgewater.

N. S. Baldwin, Meriden.

Butternuts — Chas. F. Palmer, Ridgebury.

M. T. Hatch, Bridgewater.

Hazelnuts — M. T. Hatch, Bridgewater.

OFFICIAL LIST OF AGRICULTURAL SOCIETIES IN CONNECTICUT, 1900.

NAME OF SOCIETY.	PRESIDENT.	SECRETARY.	TREASURER.
Connecticut State,*	Geo. A. Hopson, East Wallingford.	B. W. Collins, Meriden.	Eugene A. Hall.
New Haven County,*	D. N. Clarke, Woodbridge.	Theo. W. Yerrington, Norwich.	Frank S. Platt.
New London County,	J. B. Palmer, Jewett City.	J. B. Stetson, Brooklyn.	Chas. W. Hill.
Windham County,	Chas. S. Hyde, Brooklyn.	D. C. Kilbourn, Litchfield.	P. B. Sibley.
Litchfield County,*	Harry Sedgewick, Cornwall Hollow.	E. M. Candee, Naugatuck.	E. A. Hotchkiss.
Beacon Valley,	F. S. Truesdell, Naugatuck.	Daniel Webster, Berlin.	Francis H. Shaw.
Berlin.	H. Wilcox, Berlin.	John P. Callahan, Branford.	W. R. Foote.
Branford.	Edwin Doolittle, Branford.	B. A. Peck, Bristol.	B. A. Peck.
Bristol Fair Corporation,*	Ard Welton, Plymouth.	J. S. Kirkham, Newington.	Jasper A. Smith.
Cedar Valley,*	Levi S. Wells, New Britain.	Jasper A. Smith, Chester.	Geo. H. Brooks.
Chester,*	George A. Bogart, Chester.	Clifford H. Everts, Clinton.	Clinton Phelps.
Clinton,*	Edwin H. Wright, Clinton.	Wilbur H. Gay, East Granby.	J. W. Bacon.
East Granby,*	C. H. Hanchett, East Granby.	G. M. Rundie, Danbury.	B. F. Case.
Danbury.	Samuel F. Perry, Collinsville.	E. A. Hough, Collinsville.	L. C. Spring.
Farmington Valley.	Oliver F. Rundle, Danbury.	M. C. Hayes, Granby.	E. R. Davis.
Granby.	Geo. O. Beach, W. Granby.	Samuel Spencer, Guilford.	Patrick Hogan, Jr.
Guilford.	Wm. H. Lee, Guilford.	Albert W. Buell, Harwinton.	E. N. Willard.
Harwinton.	Wm. J. Barber, Harwinton.	N. H. Everts, Killingworth.	E. A. Hall.
Killingworth,*	D. K. Stevens, Killingworth.	Edward N. Willard, Madison.	Edwin J. Emmons.
Madison.	S. A. Scranton, Madison.	Geo. W. Fairchild, Meriden.	Henry G. Curtis.
Meriden,*	Benj. W. Collins, Meriden.	J. Edwin Hungerford, New Milford.	Edward L. Clark, Jr.
New Milford.	J. LeRoy Buck, New Milford.	P. H. McCarthy, Newtown.	F. C. Clark.
Newtown.	Theron E. Platt, Newtown.	Arthur D. Clark, Orange.	Francis A. Randall.
Orange.	Watson S. Woodruff, Orange.	Wm. W. Hughes.	Charles E. Curtis.
Oxford,*	W. B. McEwen, Oxford.	Richard Gorman, Putnam.	W. H. Cummings.
Putnam Fair Association.	G. D. Bates, Putnam.	Ed. F. Badmington, Rockville.	H. S. Abel.
Rockville Fair Association,	Andrew Kingsbury, N. Coventry.	Geo. C. Eno, Simsbury.	J. O. Haskins.
Simsbury.	Edmund A. Hoskins, Simsbury.	Wm. H. Cummings, Southington.	D. E. Clark.
Southington.	Geo. L. Messenger, Southington.	C. F. Beckwith, Stafford Springs.	C. A. Thompson.
Stafford Springs.	E. C. Dennis, Stafford Springs.	W. J. Stiles, Suffield.	J. P. Stevenson.
Suffield.	Wm. S. Pinney, Suffield.	S. T. Palmer, Shelton.	Chas. C. Harris.
Union (Monroe, etc.),	C. J. Wakeley, Oronoque.	Milo Hamilton, Ellington.	M. Eugene Lincoln.
Union (Somers, etc.),	Benj. E. Pinney, Ellington.	D. W. Ives, Wallingford.	W. H. Filley.
Wallingford.	M. E. Cook, Wallingford.	Chas. C. Harris, Wethersfield.	E. M. Upson.
Wethersfield.	Stephen F. Willard, Wethersfield.	M. Eugene Lincoln, Willimantic.	A. E. Bruun.
Willimantic Fair Association,	Geo. W. Barnham, Willimantic.	Geo. M. Wrisley, Windsor.	
Windsor.	H. H. Ellisworth, Windsor.	E. M. Upson, Wolcott.	
Wolcott.	Thomas Fairclough, Wolcott.	H. W. Hibbard, Woodstock.	
Woodstock.	Chester E. May, E. Woodstock.		

* No fair.

SOCIETIES.	Cash on hand.	Single Admission Tickets.	Membership or Season Tickets.	Grand Stand.	Donations and Un-claimed Premiums.	Entrance Fees, Trials of Speed.	Other Entrance Fees.	Rent of Grounds.	State Appropriation, 1899.	Other Sources.	TOTALS.	State Appropriation, 1900.
New London County,.....	\$13.55	\$2,636.35	\$104.00	\$381.25	.....	\$450.00	\$138.50	\$745.12	\$290.54	\$42.00	\$4,791.31	\$306.60
Windham County,.....	6.25	1,205.47	42.00	177.70	.....	270.00	60.00	328.30	232.57	127.03	2,507.33	282.80
Beacon Valley,.....	55.48	346.48	66.00	.....	.....	12.00	24.00	83.00	136.86	.....	712.82	124.41
Berlin,.....	273.44	387.50	88.00	38.90	.....	.....	.....	45.00	131.61	80.96	1,043.41	124.60
Branford,.....	138.05	1,910.75	.....	322.20	.....	800.00	.....	232.50	104.16	51.85	607.60	127.84
Chester,.....	37.21	150.08	16.56	.....	.....	.....	.....	15.62	111.29	.....	330.70	122.17
Dapbury,.....	2,958.22	15,130.19	.....	3,076.00	.....	1,312.50	1,531.25	2,773.00	913.06	126.74	30,320.96	1,154.96
Farmingdon Valley,.....	212.56	1,020.80	.....	172.50	.....	360.00	73.20	321.75	166.98	104.50	2,432.29	175.67
Granby,.....	.....	601.35	.....	.....	\$14.90	240.00	.....	62.35	106.51	164.58	1,239.69	111.18
Gulford,.....	42.85	105.00	35.60	.....	73.25	.....	.....	.....	212.06	.....	.....	118.25
Harwinton,.....	136.04	.....	175.00	.....	.....	.....	35.05	349.00	114.74	636.58	636.58	133.11
Madison,.....	.....	65.41	40.90	.....	15.00	.....	.....	19.50	113.48	81.75	393.89	129.51
New Milford,.....	493.97	975.85	.....	170.00	.....	360.00	.....	377.50	157.74	60.58	2,401.39	158.99
Newtown,.....	6.22	1,222.90	.....	476.80	120.00	870.00	3.00	230.75	176.38	68.67	2,874.47	178.94
Orange,.....	459.94	1,016.60	96.00	167.55	34.00	45.00	55.00	270.75	112.48	471.05	2,548.92	147.71
Putnam Park Fair Ass'n,.....	18.35	1,409.81	.....	507.39	.....	31.72	1,105.00	454.45	194.06	.....	5,376.68	110.90
Rockville Fair Ass'n,.....	197.05	1,889.20	158.60	445.00	31.87	472.50	52.50	692.90	692.90	84.80	4,211.49	196.47
Simsbury,.....	**39.12	536.75	.....	.....	.....	357.00	.....	101.40	119.69	19.45	1,173.01	130.68
Southington,.....	716.35	.....	.....	95.40	.....	295.00	78.40	164.43	166.24	52.20	1,568.02	131.68
Stafford Springs,.....	1,893.71	3,410.64	238.00	883.00	.....	535.00	159.25	1,185.15	313.16	85.53	8,673.44	316.38
Suffield,.....	18.22	1,146.50	.....	96.25	.....	315.00	.....	95.10	119.74	661.03	2,451.84	105.00
Union (Monroe, etc.),.....	1.73	651.65	118.00	62.60	.....	148.00	.....	81.50	144.51	175.55	1,393.54	137.73
Union (Somers, etc.),.....	1,155.96	.....	9.00	.....	14.10	.....	.....	39.50	128.51	142.64	1,490.71	128.99
Wethersfield,.....	28.66	82.00	60.00	276.60	101.23	450.00	35.00	10.00	101.39	100.38	508.66	102.78
Willimantic,.....	18.94	1,203.80	47.00	.....	.....	.....	10.00	.....	109.70	324.45	2,798.49	108.57
Windoor,.....	.....	183.00	.....	.....	.....	.....	23.80	387.00	.....	188.24	393.04	129.55
Wolcott,.....	1,473.86	47.65	75.00	.....	.....	.....	.....	.....	173.92	198.72	2,422.65	176.87
Woodstock,.....	1,671.00	913.16	165.00	177.40	33.00	88.00	93.50	80.00	178.40	162.35	2,915.99	245.60
Conn. Hort. Soc.,.....	13.00	44.50	86.00	.....	4.00	.....	.....	188.17	137.18	194.00	418.68	116.66
Conn. Pom. Soc.,.....	218.51	235.25	.....	.....	.....	.....	.....	.....	.....	.....	.....	142.77
Conn. Dairy Ass'n,.....	432.49	95.00	.....	.....	.....	.....	.....	.....	139.78	1,069.49	1,756.66	133.55

+ Also annual appropriation \$500.00. * Score cards, \$31.00; advertisements in Fair book \$104.00; three notes, \$1,384.90; capital stock, \$135.00.

** Borrowed, \$39.12. *** State appropriation, \$956.69; advertising, \$67.50; butter and cheese sold, \$15.30.

RETURNS OF AGRICULTURAL SOCIETIES, 1900—FINANCES, CONTINUED.

SOCIETIES.	Expenses of Fair.	Premiums for Speed.	Premiums for Amusement.	Other Premiums and Gratuities.	Permanent Improvements.	Other Expenses.	Cash on hand.	Total.	Indebtedness of Society.	Real Estate.	Personal Estate.	Number of Members.	No. of Stockholders.	Capital Stock.	Admission Tickets.	Season Tickets.	Grand Stand.
New London Co.,...	\$1,064.17	\$1,087.50	\$539.40	\$1,166.45	\$174.05	\$486.51	\$278.73	\$4,791.31	\$4,000.00	\$10,000.00	.....	228	.....	.....	\$0.35	\$1.00	\$0.25
Windham County,	654.98	775.00	120.00	1,044.00	225.86	30.50	.....	.....	114.75	5,000.00	\$200.00	667	.....	.....	.25	1.00	.20
Beacon Valley,	345.91	63.80	63.00	326.00	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.25	.....	.....
Berlin,	280.43	.....	46.53	227.00	.....	65.13	446.32	1,045.41	.....	.....	500.00	79	.....	.....	.40	.....	.25, .15
Brantford,	700.00	.....	771.00	243.70	.....	175.00	.....	.....	50.00	.....	.....	.....	.....	.....	.10	.25	.....
Chester,	82.40	.....	9.25	214.45	.....	10.00	14.60	330.70	.....	.....	.....	66	.....	.....	.10	.....	.....
Danbury,	12,018.38	2,542.00	1,127.80	5,545.50	714.33	6,200.00	1,173.95	30,320.96	20,000.00	3,000.00	3,000.00	293	293	\$12,000	35	5.00	.25, .20
Farmington Valley	493.64	750.00	490.56	490.56	.....	232.12	415.98	2,432.23	2,400.00	9,203.07	.....	81	81	5,000	.25	.....	.20
Granby,	176.66	590.00	70.00	157.70	.....	242.40	2.93	1,239.69	300.70	2,500.00	.....	70	86	3,000	.15, .25	.....	.50
Guilford,	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.15	.50	.....
Harwinton,	225.38	.....	270.90	270.90	.....	.....	140.30	636.58	.....	.....	250.00	130	.....	.....	.....	.....	.....
Madison,	50.00	.....	6.50	252.35	.....	86.15	32.00	.....	125.00	30.00	.....	81	.....	.....	.10	.....	.....
New Milford,	683.41	730.00	55.00	404.50	278.00	100.00	150.48	2,401.39	2,000.00	.....	.....	.....	.....	5,000	.25	.....	.25
Newtown,	80.70	917.50	360.00	507.45	.....	917.78	91.04	2,874.47	1,000.00	7,000.00	.....	119	.....	.....	.25	1.00	.25
Orange,	806.40	145.00	11.50	346.25	1,525.03	135.00	.....	3,096.18	477.26	.....	1,765.00	97	.....	.....	.25	.....	.....
Putnam Park Ass'n	2,167.85	2,459.70	250.00	156.25	17.00	300.00	25.88	5,376.68	7,900.00	16,000.00	.....	153	153	10,000	.35	.....	.....
R'ville Fair Ass'n	740.09	1,175.00	652.71	597.95	601.98	.....	367.36	4,211.49	750.00	4,000.00	.....	106	106	10,000	.35	1.00	.25
Simsbury,	185.76	690.00	15.00	206.75	.....	75.50	.....	1,173.01	.....	.....	.....	.....	.....	.....	.25	.....	.....
Southington,	546.55	600.00	65.00	263.55	.....	.....	.....	.....	.....	5,000.00	100.00	.....	11	2,600	.25	.....	.15
Stafford Springs,	1,449.68	1,376.00	1,235.00	1,216.94	1,449.68	.....	3,395.92	8,673.44	.....	11,000.00	.....	350	66	*5,000	.35	1.00	.25
Stafford,	.....	930.00	127.00	125.84	.....	.....	149.44	2,451.84	1,270.00	5,000.00	50.00	.....	360	3,300	.35, .15	.....	.10
Union (Monr'e etc.)	419.00	325.00	.....	294.75	.....	1,119.56	156.61	1,383.54	1,190.00	1,200.00	.....	110	.....	.....	.25	1.00	.20
Union (Som'rs etc.)	.....	.....	57.00	249.65	.....	90.75	1,092.31	1,490.71	.....	.....	.....	.....	.....	.....	.....	.....	.....
Wethersfield,	64.95	.....	.....	114.35	.....	205.30	34.11	508.66	1,475.00	7,000.00	300.00	260	47	5,000	.20	.40	.....
Windsor,	799.48	1,232.50	616.75	144.95	.....	75.00	.....	2,797.98	200.00	.....	.....	.....	.....	9,850	.35	1.00	.25
Windsor, Fair Ass'n	458.97	.....	50.00	216.40	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.25	.....	.....
Woodstock,	335.47	.....	.....	496.75	.....	.....	1,591.43	2,493.65	.....	.....	100.00	75	.....	.....	.25, .10	1.00	.....
Woodstock, Soc.,	447.24	203.00	202.31	851.55	128.39	172.50	11.00	2,015.99	700.00	8,000.00	.....	484	.....	.....	.25	1.00	.15
Conn. Pom. Soc.,	37.96	.....	.....	320.45	.....	.....	.....	.....	.....	.....	.....	340	.....	.....	.....	.....	.....
Conn. Dairy Ass'n,	.....	.....	.....	304.15	.....	.....	.....	.....	.....	.....	850.00	80	.....	.....	.25, .16, .10	1.00	.....
Conn. Hort. Soc.,	61.63	.....	.....	186.00	.....	226.23	.....	473.86	.....	.....	.....	.....	.....	.....	.....	.....	.....

* Paid in \$2,000.

† Preferred, 54; common, 221.

ANALYSIS OF PREMIUMS AND GRATUITIES.—CONTINUED. FARM PRODUCTS.

SOCIETIES.	Fruits.	Flowers.	Other Cult. Crops.	Butter.	Cheese.	Honey and Wax.	Bread and Cake.	Sugar, Syrup, Preserved Fruit.	Other Farm Products.	Agricultural Implements.	Mechanical Inventions.	Fine Arts and Rarities.	Decorated Carts and Trailers of Oxen.	Plowing at Exhibition.	Grange Exhibit.	Medals.	Diplomas.	Total Farm Products.
New London County,...	\$25.70	\$11.25	.....	.....	.....	.....	\$5.00	\$3.75	.....	\$3.00	\$30.00	\$94.00	.....	.....	.....	.....	.....	\$80.45
Windham County,...	66.50	31.50	.....	\$4.50	\$4.50	.....	.75	17.95	.....	3.00	64.75	190.30	.....	.....	.....	.....	.....	180.70
Beacon Falls,...	21.25	6.25	.....	.25	.....	.....	.....	6.00	.....	.....	3.25	11.25	\$12.50	.....	.....	.....	.....	65.00
Berlin,...	37.25	6.25	\$16.50	6.00	.....	.....	.....	4.75	.....	.....	.....	16.75	8.00	.....	.....	.....	.....	114.25
Branford,...	71.25	4.75	22.50	1.00	.....	.....	1.25	4.25	.....	.....	.....	20.70	.....	.....	.....	.....	.....	113.25
Chester,...	21.55	4.20	.....	1.40	.....	.....	.....	8.25	.....	.....	.....	14.60	11.00	.....	.....	.....	.....	105.15
Danbury,...	319.95	135.25	3.75	3.50	1.00	.....	41.50	84.50	\$978.45	.....	578.80	580.50	.....	.....	.....	49	.....	978.80
Farmington Valley,...	17.40	3.00	4.40	2.00	.50	.....	7.30	13.50	.....	.....	.....	16.75	.....	.....	.....	.....	.....	48.10
Granby,...	1.50	1.45	.....	2.00	.....	.....	.....	6.25	.....	.....	.....	17.25	.....	.....	.....	.....	.....	17.20
Gulford,...	40.75	.75	.....	.....	4.45	.....	7.50	2.00	.....	.....	.....	16.00	19.00	.....	.....	.....	.....	48.10
Harwinton,...	12.50	7.60	9.25	.55	.35	.....	.....	9.65	.....	11.30	.....	23.96	41.50	.....	.....	.....	.....	89.95
Madison,...	28.40	3.40	.50	.....	.....	1.00	10.50	2.50	.....	.....	.....	33.96	30.00	.....	.....	2	.....	72.55
New Milford,...	72.00	2.75	.....	.....	.....	.....	6.00	8.50	.....	1.50	.....	22.75	80.25	.....	.....	.....	.....	111.35
Newtown,...	52.50	14.50	.....	3.00	.75	.....	32.50	16.50	.....	.....	.....	51.20	10.00	.....	.....	.....	.....	90.00
Orange,...	16.00	1.00	.....	.....	.....	.....	5.00	1.00	.....	.....	.....	23.00	.....	.....	.....	.....	.....	205.25
Putnam Park Ass'n,...	25.25	14.75	.....	.....	.....	.....	15.00	2.00	.....	.....	.....	26.50	.....	.....	.....	112	.....	50.25
Rockville Fair Ass'n,...	51.00	10.50	.....	6.00	.....	.....	8.00	.....	.....	.....	.....	56.95	15.00	.....	.....	.....	.....	76.05
Simsbury,...	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	75.50
Southington,...	22.75	1.00	.....	.....	.....	.....	2.85	6.25	.....	.....	7.15	7.75	.....	.....	.....	.....	.....	58.75
Stafford Springs,...	36.25	7.15	.....	1.00	.75	.....	8.35	15.55	.....	.....	33.50	45.30	.....	.....	.....	.....	.....	104.50
Stafford,...	85.64	10.50	.....	.....	.....	.....	.....	.....	.....	.....	.....	10.50	.....	.....	.....	.....	.....	130.50
Suffield,...	23.50	6.25	.....	1.50	.....	.....	6.25	1.50	.....	.....	16.00	61.50	15.00	.....	.....	19	.....	130.84
Union (Monroe, etc.),...	.....	.....	.....	.....	.....	.....	2.15	.....	.....	9.00	.....	23.00	.....	.....	.....	.....	.....	59.25
Union (Somers, etc.),*	5.80	.....	.....	.....	.....	.....	.....	2.00	.....	.....	.....	1.00	.....	.....	.....	.....	.....	58.45
Watersfield,...	12.35	2.00	.....	.....	.....	.....	.....	.....	.....	.....	.....	32.25	.....	.....	.....	.....	.....	53.35
Williamantic Fair Ass'n,...	18.25	6.00	.....	.....	.....	.....	.....	.....	.....	.....	.....	33.00	.....	.....	.....	.....	.....	52.25
Windsor,...	12.40	9.75	27.00	1.50	.....	.....	2.85	7.90	.....	.....	.....	33.00	.....	.....	.....	.....	.....	77.80
Wolcott,...	24.75	2.25	.....	.....	.....	.....	4.75	2.00	.....	.....	.....	.....	.....	.....	.....	.....	.....	135.00
Woodstock,...	44.25	44.75	23.25	12.50	.....	.....	21.70	51.00	.....	.....	23.50	.....	16.00	.....	.....	.....	.....	320.75
Conn. Pom. Soc.,...	203.75	.....	.....	.....	.....	.....	.....	.....	.....	.....	17.25	*71.95	32.00	\$21.00	.....	.....	.....	320.75
Conn. Dairy Ass'n,...	.....	.....	.....	280.05	10.00	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	390.05
Conn. Hort. Soc.,...	9.75	147.75	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	16.60	.....	.....	1	.....	163.00

* Children's Exhibit.

NUMBER OF ANIMALS EXHIBITED.

SOCIETIES.	Bulls.	Milch Cows.	Heifers.	Calves.	Working Oxen (pairs).	Draft Oxen (pairs).	Steers (pairs).	Rat Cattle.	Horses — except speed.	Horses — speed.	Sheep.	Swine.	Poultry (coops).	All other Stock.
New London County,.....	19	196	40	23	39	.....	22	11	70	23	182	13	110	.....
Windham County,.....	38	73	81	37	28	.....	27	.....	44	42	42	39	30	.....
Beacon Valley,.....	8	3	5	5	15	.....	10	6	20	16	.....	.....	71	.....
Berlin,.....	4	12	6	1	4	.....	.....	2	49	.....	.....	8	65	.....
Branford,.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Chester,.....	3	9	5	8	14	2	11	.....	8	.....	.....	1	20	1
Danbury,.....	49	64	77	29	76	5	37	.....	121	65	25	16	602	.....
Farmington Valley,.....	19	43	13	11	14	9	19	2	9	.....	15	11	.....	.....
Granby,.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Guilford,.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Harwinton,.....	9	4	7	8	*66	.....	.....	4	13	.....	.....	2 Pens	120	.....
Madison,.....	2	7	7	4	7	.....	12	1	7	.....	.....	8 Pens	70	.....
New Milford,.....	11	36	30	16	24	.....	23	5	17	.....	.....	.....	1	.....
Newtown,.....	16	25	23	16	34	.....	36	7	30	41	.....	3	65	10
Orange,.....	5	10	7	4	*5	.....	1	1	26	.....	6	2	16	.....
Putnam Park Ass'n,.....	2	23	13	.....	.....	.....	.....	.....	.....	24	.....	.....	6	.....
Rockville Fair Ass'n,.....	4	19	13	16	18	.....	.....	.....	18	25	.....	4	285 birds	+66
Simsbury,.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Southington,.....	20	51	12	10	23	.....	11	5	.....	21	13	11	154	+1
Stafford Springs,.....	12	42	36	22	35	.....	9	.....	.....	.....	.....	.....	.....	.....
Sufield,.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Union (Monroe, etc.),.....	2	7	5	1	39	.....	13	6	28	.....	.....	2	10	.....
Union (Somers, etc.),.....	6	48	25	10	8	.....	15	.....	16	.....	3	18	40	.....
Wethersfield,.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	7	.....	241	.....
Williamantic Fair Ass'n,.....	.....	.....	.....	.....	.....	.....	.....	.....	40	27	.....	.....	.....	.....
Windoor,.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Wolcott,.....	21	51	18	14	40	15	12	5	24	.....	6	.....	238	7 herds
Woodstock,.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Connecticut Hort. Society,.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Conn. Dairy Ass'n,.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Conn. Pom. Soc.,.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....

And steers.

+7 herds.

+ Trained steers.

AGRICULTURAL FAIRS IN CONNECTICUT.—1900.

SOCIETIES.	PLACE.	DATE.	ATTENDANCE.					
			Monday.	Tuesday.	Wednesday.	Thursday.	Friday.	Saturday.
New London County.	Norwich.	Sept. 3-5.	4,000	5,000	1,250	1,100	.....	10,250
Windham County.	Brooklyn.	Sept. 18-20.	.....	300	2,000	1,100	.....	3,400
Beacon Valley.	Naugatuck.	Sept. 18-19.	.....	1,000	1,500	.....	.....	2,500
Berlin.	Berlin.	Sept. 26.	.....	1,500	2,500	.....	.....	2,500
Branchford.	Branchford.	Sept. 18-20.	.....	.....	5,000	2,500	.....	9,000
Chester.	Chester.	Oct. 3.	.....	3,370	500	.....	.....	500
Danbury.	Danbury.	Oct. 1-6.	2,547	.....	7,851	20,345	16,110	4,534
Farmington Valley.	Collinsville.	Sept. 6-7.	.....	.....	800	1,300	3,300	4,600
Granby.	Granby.	Sept. 26-27.	.....	.....	.....	2,200	.....	3,000
Guilford.	Guilford.	Sept. 26.	.....	.....	3,500	.....	.....	3,500
Harwinton.	Harwinton.	Oct. 2.	15,000	.....	.....	.....	.....	15,000
Madison.	Madison.	Oct. 3.	.....	.....	1,500	.....	.....	1,500
New Milford.	New Milford.	Sept. 11-14.	.....	5,000	1,800	1,200	500	4,000
Newtown.	Newtown.	Sept. 25-27.	.....	1,000	4,000	3,000	.....	8,000
Orange.	Orange.	Sept. 12-13.	.....	.....	1,600	2,500	.....	4,100
Putnam Park Ass'n.	Putnam Park.	Sept. 11-13.	.....	300	2,000	1,146	.....	3,446
Rockville.	Rockville.	Sept. 18-20.	.....	1,000	4,500	5,700	.....	11,200
Simsbury.	Simsbury.	Oct. 3-4.	.....	1,500	.....	.....	.....	3,500
Southington.	Southington.	Sept. 3-4.	2,000	2,000	10,000	5,000	.....	17,000
Stafford.	Stafford.	Oct. 2-4.	.....	700	2,208	.....	.....	2,908
Stafford Springs.	Stafford.	Sept. 18-19.	.....	.....	.....	.....	.....	.....
Union (Monroe, etc.).	Union.	Sept. 18-19.	.....	.....	.....	.....	.....	.....
Union (Somers, etc.).	Somers.	Sept. 26.	.....	350	300	350	.....	950
Wethersfield.	Wethersfield.	Sept. 23-27.	.....	800	4,000	1,000	600	5,800
Willmantic Fair Ass'n.	Willmantic.	Sept. 12-14.	.....	.....	500	3,000	.....	3,100
Windsor.	Windsor.	Oct. 10.	.....	.....	.....	.....	.....	3,547
Wolcott.	Wolcott.	Sept. 18-19.	2,044	.....	1,503	.....	.....	602
Woodstock.	So. Woodstock.	* .....	.....	.....	.....	.....	.....	.....
Conn. Hort. Soc.	Hartford.	Feb. 7-8.	.....	.....	.....	.....	.....	.....
Conn. Dairy Asso.	Hartford.	Jan. 16-17.	.....	.....	.....	.....	.....	.....
Conn. Pom. Soc.	Hartford.	.....	.....	.....	.....	.....	.....	.....

* April, June 18th, 14th, July, about Sept. 6th, 7th, Nov. 8-10th.

OFFICIAL DIRECTORY

OF THE

CONNECTICUT PATRONS OF HUSBANDRY,

FOR 1901.

OFFICERS OF CONNECTICUT STATE GRANGE.

Master, B. C. PATTERSON, Torrington.
 Overseer, IVERSON C. FANTON, Westport.
 Lecturer, FRANK S. HOPSON, Station 3, Bridgeport.
 Steward, J. B. BLIVEN, North Franklyn.
 Asst. Steward, ROBERT W. ANDREWS, New Britain.
 Chaplain, REV. C. H. SMITH, Plymouth.
 Treasurer, NORMAN S. PLATT, New Haven.
 Secretary, HENRY E. LOOMIS, Glastonbury.
 Gate-Keeper, E. H. WRIGHT, Clinton.
 Ceres, MISS GERTRUDE U. BRADLEY, Waterbury.
 POMONA, MRS. SABRA M. KELSEY, Higganum.
 Flora, MRS. MAUDE K. WHEELER, Storrs.
 Lady Steward, MRS. ALICE L. POTTER, North Woodstock.

EXECUTIVE COMMITTEE.

ORSON S. WOOD, Ellington,	Term Expires, 1902.
J. H. HALE, South Glastonbury,	" " 1903.
H. F. POTTER, New Haven,	" " 1904.
B. C. PATTERSON, <i>ex officio</i> ,	" " 1902.
H. E. LOOMIS, <i>ex officio</i> ,	" " 1902.

FINANCE COMMITTEE.

H. C. DUNHAM, Middletown.	R. R. WOLCOTT, Wethersfield.
GEORGE A. HOPSON, East Wallingford.	

OFFICERS OF THE GRANGES.

NAME.	MASTER.	LECTURER.	SECRETARY.
POMONA GRANGES.			
Central Pomona, No. 1,	E. F. Gaylord, Bristol,	Robert W. Andrews, New Britain,	Chas. E. Bacon, Middletown.
Quineburg Pomona, 2,	C. A. Potter, North Woodstock,	Mrs. Lisa K. Fuller, Scotland,	L. H. Healy, N. Woodstock.
East Central Pomona, 3,	O. S. Wood, Ellington,	Charles H. Brainerd, Thompsonville,	Mrs. Laura J. Brewer, Hillstown.
Mountain County Pomona, 4,	Art Welton, Plymouth,	T. Goodenough, Winchester,	K. K. Kimberly, West Torrington.
New Haven Co. Pomona, 5,	Robert O. Eaton, Montowese,	Mrs. C. A. D. Allen, Wallingford,	Mrs. L. P. Tuttle, North Haven.
New London Co. Pomona, 6,	J. E. Hall, Colchester,	H. W. Morse, Jewett City,	J. E. Tanner, Campbell's Mills.
Excelsior Pomona, 7,	O. D. Esby, Watertown,	Mrs. Martha Judd, Middlebury,	Mrs. Sarah S. Talmadge, Prospect.
Seaview Pomona, 8,	Stephen P. Sterling, Haverburg,	Mrs. Ida H. McAllister, Saybrook,	D. Eugene Smith, Madison.
Fairfield County Pomona, 9,	H. W. Andrews, Brookfield Center,	Rev. J. H. Hoyt, New Canaan,	J. H. Blakeman, Oronoque.
SUBORDINATE GRANGES.			
Washington, No. 11,	E. C. Whitehead, Wash. Depot,	Mrs. E. C. Whitehead, Wash. Depot,	Robert W. Squires, Wash. Depot.
Tunxis, 13,	T. E. Griswold, Bloomfield,	F. L. Granger, Jr., Bloomfield,	A. C. Case, Bloomfield.
Hope, 20,	K. K. Kimberly, West Torrington,	Mrs. Martha Ives, West Torrington,	H. R. Leach, Litchfield.
Lebanon, 21,	Fred N. Taylor, Lebanon,	Mrs. J. B. Bilven, North Franklin,	N. S. Loomis, Lebanon.
Advance, 22,	J. C. Eddy, Simsbury,	George Patterson, Simsbury,	Mrs. Hattie H. Eno, Simsbury.
Cheshire, 23,	Walter H. Baldwin, Cheshire,	Miss Leona B. Henion, Cheshire,	G. A. Hitchcock, Cheshire.
Berlin, 24,	Earl Cooley, Berlin,	Julius E. Woodruff, Berlin,	A. H. Bushnell, Berlin.
Union, 25,	Julius B. Lewis, Southington,	Miss Ellen Larson, Plantsville,	Mrs. E. H. Barnes, Southington.
Glastonbury, 26,	Geo. H. Carrier, Glastonbury,	Miss F. J. Hollister, So. Glastonbury,	Mrs. Emma Hale, So. Glastonbury.
Suffield, 27,	Frank H. Sikes, Mapleton,	Miss N. Belle Fuller, Mapleton,	Edwin F. Newton, Mapleton.
Meriden, 28,	Julius H. Yale, Meriden,	William B. Rice, Meriden,	Arthur E. Owen, Meriden.
Wapping, 29,	W. W. Green, Wapping,	Mrs. Nettie Stoughton, Wapping,	Miss May Foster, Wapping.
Manchester, 31,	Chas. B. Warren, So. Manchester,	Miss M. Naomi Warren, Manchester,	Mrs. Niles Scoville, South Manchester.
North Cornwall, 32,	Charles L. Gold, West Cornwall,	Miss Adele T. Peck, West Cornwall,	K. B. Loomis, South Wallingford.
Wallingford, 33,	George A. Hopson, Wallingford,	Mrs. C. A. D. Allen, Wallingford,	Delavan W. Ives, Wallingford.
Cawasa, 34,	John Case, Canton Center,	John Crowley, Canton Center,	H. A. Bristol, Canton Center.
North Haven, 35,	Charles N. Turner, North Haven,	Mrs. L. P. Tuttle, North Haven,	Charles H. Thorpe, North Haven.
Little River, 36,	Mrs. N. C. Cleveland, Hampton,	Mrs. A. M. Burnham, Hampton,	Miss Delia C. Litchfield, Hampton.
East Hartford, 37,	Louis T. Judson, Silver Lane,	C. R. Risley, Silver Lane,	Mrs. Alice M. Warren, Silver Lane.
New Canaan, 38,	J. E. Selleck, New Canaan,	Thomas Rice, New Canaan,	Mrs. S. E. St. John, New Canaan.
Burnett, 39,	Hubert S. Blake, New Britain,	Robert W. Andrews, New Britain,	Mrs. F. H. Sharpe, New Britain.
Seneca, 40,	Byron H. Evans, South Woodstock,	Dr. G. Austin Bowen, So. Woodstock,	E. P. Berrian, South Woodstock.
Matthiassett, 42,	E. J. Roberts, Middletown,	Mrs. Sarah Hubbard, Middletown,	Mrs. Fannie W. Prior, Middletown.
Brooklyn, 43,	C. S. Hyde, Brooklyn,	N. G. Williams, Brooklyn,	H. D. Crosey, Brooklyn.
Newington, 44,	Thomas A. Francis, Newington,	Miss Lizzie A. Root, Newington,	Mrs. Nellie L. Eddy, New Britain.
Ellington, 46,	R. Allen Sikes, Ellington,	Miss C. J. G. Stenson, Ellington,	Oliver M. Charter, Ellington.

OFFICERS OF THE GRANGES.—CONTINUED.

NAME.	MASTER.	LECTURER.	SECRETARY.
Bolton,	Myron W. Sperry, Bolton,	A. W. Barker, Bristol,	Miss Maude E. White, Bolton.
Winfield,	E. F. Gayford, Bristol,	Rev. D. B. Hubbard, Middletown,	Merian Curtis, Bristol.
Tolland,	Julius C. Atkins, Middletown,	Mrs. Abbie F. Hurlbut, Rockville,	F. E. Boardman, Middletown.
Vernon,	Charles W. Clough,	Mrs. Eva T. Smith, Vernon Center,	Chas. S. Hurlbut, Rockville.
Poquonock,	Ed S. Hough, Poquonock,	E. Brown, Poquonock,	Mrs. E. D. Putkin, Taftsville.
Plainville,	Edgar D. Taylor, Plainville,	Mrs. Louie A. Ryder, Plainville,	Mrs. Alice J. Alford, Poquonock.
Stafford,	J. M. Larned, Stafford Springs,	Mrs. E. A. Holbrook, Stafford,	Mrs. Alice J. Baker, Plainville.
East Haddam,	Joseph H. Lee,	Mrs. M. T. Bingham, Little Haddam,	Mrs. M. P. Lasbury, Stafford.
Durham,	C. W. Coe, Durham Center,	Alice Hull, Durham Center,	Samuel E. Williams, Moodus.
West Hartford,	D. G. Francis, West Hartford,	Mrs. Emily Griswold, West Hartford,	Miss Lena Sage, Durham Center.
Saybrook,	John S. Dickinson, Saybrook,	Mrs. Ida McAllister, Saybrook,	James E. Smith, West Hartford.
Crystal Lake,	Arthur M. Keith, Eastford,	Mrs. Lucy A. George, Eastford,	Miss Marion T. Ayer, Saybrook.
Wolf Den,	Joseph H. Elliott, Elliott,	Mrs. Walter L. Averill, Pomfret Center,	Mrs. L. F. Trowbridge, Eastford.
Eureka,	George F. Douglass, Collinsville,	Mrs. Chloe Beane, New Hartford,	William D. Fay, Abington.
Middletown,	Frank I. Miller, Middletown,	Miss Grace E. Miller, Middletown,	Mrs. M. V. Douglass, Collinsville.
Mansfield,	H. A. Ballou, Storrs,	W. A. Stocking, Jr., Storrs,	Miss Clara E. Smith, Middletown.
Quinnatiset,	Oscar Robinson, East Thompson,	Mrs. M. J. Woodard, Wilsonville,	N. S. Mayo, Storrs.
Killingworth,	Herbert C. Stevens, Killingworth,	Miss M. F. Stevens, Killingworth,	Mrs. Josephine Law, Thompson.
Cromwell,	Geo. S. Butler, Cromwell,	Mrs. S. V. Hubbard, Cromwell,	Miss Minnie E. Coe, Killingworth.
Shelton,	Eugene Kinball, Scotland,	Leander O. Haskins, Scotland,	Miss Hattie M. Hubbard, Cromwell.
Canterbury,	Lewis D. Howe, Jewett City,	Dr. J. O. Smith, South Canterbury,	Geo. C. Clark, Scotland.
Mad River,	Harry L. Coe, Waterbury,	Gertrude U. Bradley, Waterbury,	Levi N. Clark, So. Canterbury.
Plymouth,	Ralph Warner, Thomaston,	Miss Carrie Plonquet, Plymouth,	Anna Hall, Waterbury.
Indian River,	N. Truman Smith, Milford,	Fred M. Smith, Milford,	Frank Blakeslee, Plymouth.
Winchester,	T. Goodenough, Winchester Center,	E. H. Johnson, Station A, Winsted,	H. C. C. Miles, Milford.
Coverbury,	Andrew Kingsbury, Coventry,	Miss Fannie J. Kingsbury, Coventry,	W. I. Goodenough, Winchester Center.
Andover,	W. E. Fuller, Andover,	Mrs. W. A. Snow, Andover,	J. M. Copley, Andover.
Clinton,	Hosmer A. Tryon, Clinton,	Miss Mary J. Brooks, Clinton,	Clifford H. Everts, Clinton.
Colchester,	Carroll E. Staples, Colchester,	Miss Lizzie Sherman, Colchester,	Mrs. Hattie J. Strong, Colchester.
Housatonic,	Mrs. N. E. Blakeman, Oroquo,	Miss Eva L. Innis, Stratford,	George Meachen, Stratford.
Colebrook,	Lester N. Smith, Colebrook,	Ralph Reinhold, Mill Brook,	Mrs. Emma L. Blair, Colebrook.
Foxon,	C. W. Grannis, Sta. A, New Haven,	Miss N. D. Woods, Sta. A, N. Haven,	Frank M. Sperry, New Haven.
Wangumbaug,	E. F. Hutchinson, South Coventry,	Mrs. May L. Williams, So. Coventry,	Fred Potter, Williamantic.
Webstuck,	Jas. S. Chaffee, America Union, N. Y.,	Mrs. C. S. Clark, America Union, N. Y.,	H. V. D. Reed, America Union, N. Y.
Hillstown,	Joel H. Brewer, Hillstown,	James W. Bancroft, Hillstown,	Forest Buckland, Hillstown.
Ekono,	Alfred Gallup, Ekono,	Miss Lottie Stanton, Ekono,	John E. Tanner, Campbell's Mills.
Ashford,	Wilbur Lauphear, Ashford,	Rev. Austin Gardner, Ashford,	Bert H. Gardner, Warrenville.

SUBORDINATE GRANGES. — *Cont.*

Harmony,	92.	Robert Sinclair, Stenney Depot,	Bessie Hayes, Stenney Depot.	Edwin C. Shelton, Stenney Depot.
Border,	93.	J. G. Lakin, Williamantic.	Mrs. Mary S. Webster, Williamantic.	Mrs. Lillian M. French, Williamantic.
East Windsor,	94.	L. Stoughton, E. Windsor Hill,	Mrs. Kate B. Bissell, East Windsor,	H. M. Miner, Clapp, East Windsor.
Jewett City,	95.	Jacob Reid, Jewett City,	Mrs. Fannie A. Webster, Putnam,	Edwin L. Wood, Putnam.
Putnam,	96.	Amos B. Carpenter, Putnam,	B. J. Dickerman, Mt. Carmel,	F. B. Tiffany, Barkhamsted.
Barkhamsted,	97.	Wallace Case, Barkhamsted,	Mrs. Burton Tiffany, Barkhamsted,	Thomas Dunn, Mt. Carmel.
Hamden,	98.	Burton G. Cadwell, Hamden,	B. J. Dickerman, Mt. Carmel,	Rev. G. F. Goodenough, Ellsworth.
Taghannuck,	99.	E. R. Chapman, Wassaic, N. Y.,	Mrs. Alda C. Buckley, Ellsworth,	Mrs. E. C. Barrows, Stafford Springs.
Mashapaug Lake,	100.	W. G. Howard, North Ashford,	Mrs. George E. Reed, Union,	E. A. Hotchkiss, Naugatuck.
Beacon Valley,	101.	Walter A. Hotchkiss, Naugatuck,	Mrs. Belle Fowler, Avery, Somers,	Erwin D. Avery, Somers.
Somers,	102.	L. W. Russell, Somers,	Mrs. Bertha F. Avery, Somers,	Martha Coe, East Haven.
East Haven,	103.	R. H. Coe, East Haven,	C. J. Upson, New Haven,	Fred B. Plumb, Litchfield.
Litchfield,	104.	Fred L. Sharp, Litchfield,	C. J. Upson, Litchfield,	Charles P. Augur, Woodbridge.
Woodbridge,	105.	Edw. A. Hitchcock, Woodbridge,	Charles A. Bond, Woodbridge,	Mrs. H. M. H. Day, East Hampton.
East Hampton,	106.	Hermion E. Rich, East Hampton,	Mande Clarke, East Hampton,	Miss C. Ella Day, Danielson.
Killingly,	107.	Frank P. Warren, Dayville,	Warren D. Chase, Danielson,	Mrs. Emily P. McEwen, S. Killingly.
Highland,	108.	J. Tillinghast, So. Killingly,	Mrs. Ida Tillinghast, So. Killingly,	Dudley Welles, 2d, S. Wethersfield.
Wethersfield,	109.	F. N. Griswold, So. Wethersfield,	Miss Lizzie Willard, Wethersfield,	Mrs. M. C. A. Perkins, Bristol.
Rocky Hill,	110.	Samuel Ashwell, Rocky Hill,	Miss Mary Lewis, Rocky Hill,	Mrs. Helen Stevens, Deep River.
Bristol,	111.	Burdett A. Peck, Bristol,	Miss Maye Brockett, Bristol,	Mrs. Allie L. Nearing, Northfield.
Unity,	112.	Samuel S. Webb, Chester,	D. S. Southworth, Deep River,	Geo. E. Alvord, Morris.
Beacon,	113.	Charles S. Nearing, Northfield,	L. Cabell Bell, Litchfield,	Mrs. Ella M. Kelsey, Madison.
Madison,	114.	J. M. Whittlesey, Morris,	Rev. F. Lonis Grant, Northfield,	George W. Percy, Bethlehem.
Bethlehem,	115.	D. Eugene Smith, Madison,	Joseph D. Kelsey, Madison,	Cora B. Johnson, Watertown.
Watertown,	116.	James W. Flynn, Bethlehem,	Mrs. George W. Percy, Bethlehem,	Daniel W. Grosvenor, Westbrook.
Westbrook,	117.	Oran D. Estey, Watertown,	Estella Estey, Watertown,	Robt. H. Freeman, Higganum.
Higganum,	118.	David C. Dibble, Westbrook,	Horace E. Kelsey, Westbrook,	Mrs. Lois Pendleton, South Canaan.
Hollenbeck,	119.	Myron G. Skinner, Higganum,	Dr. Leroy A. Smith, Higganum,	Miss Mattie E. Barsby, No. Woodbury.
Pleasant Valley,	120.	A. N. Skilton, Woodbury,	Miles L. Blodgett, Falls Village,	Harold B. Waldo, Glastonbury.
Goodwill,	121.	Mrs. R. E. Goodale, Glastonbury,	M. F. Skelley, Woodbury,	Miss Josephine T. Clark, Orange.
Orange,	122.	Bela M. Alling, Tyler City,	Miss A. S. Wadsworth, Glastonbury,	John J. Northrup, Newtown.
Pondauk,	123.	Chas. M. Batesford, Sandy Hook,	Mrs. Bela M. Alling, Tyler City,	T. F. S. Bartlett, Shelton.
Farmill River,	124.	S. B. Brownson, Shelton,	Mrs. S. F. Schermerhorn, Newtown,	Amelia J. Fuller, Columbia.
Columbia,	125.	Henry B. Hutchins, Columbia,	Julia A. Sturges, Shelton,	Max Schnell, Warren.
Greenfield Hill,	126.	F. F. Johnson, Warren,	William P. Johnson, Columbia,	Fred C. Banks, Greenfield Hill.
Trumbull,	127.	Andrew B. Wakeman, Greenfield Hill,	Austin R. Humphrey, Warren,	Wm. H. Brinsmade, Bridgeport.
Silver Lake,	128.	Albert E. Linley, Trumbull,	Simonee Pease, Greenfield Hill,	Kate B. Whitford, Sharon.
East Canaan,	129.	Joseph J. Ryan, Sharon,	Miss O. E. Watrous, Bridgeport,	E. S. Roberts, East Canaan.
Willington,	130.	Jarvis C. Stevens, East Canaan,	Miss Mary Merwin, Sharon,	A. H. Eldredge.
Middlebury,	131.	F. W. Pratt, W. Willington,	Miss Edith Lawrence, East Canaan,	A. S. Clark, Middlebury.
Plainfield,	132.	G. Fred Abbott, Middlebury,	Mrs. C. H. Brown,	Miss N. M. Bulkeley, Plainfield.
Brookfield,	133.	H. B. Chapman, Central Village,	Mrs. Martha Judd, Middlebury,	Wm. J. Beehler, Brookfield.
	134.	S. B. Terrill, Brookfield Centre,	Mrs. Julia Eaton, Wauregan,	
	135.		Mrs. Martha Andrews, Brookfield Cr.	

OFFICERS OF THE GRANGES.—CONCLUDED.

NAME.	MASTER.	LECTURER.	SECRETARY.
Rock Rimmon, 142, Goshen, 143, Prospect, 144, Rippowam, 145, Norfield, 146, Lyme, 147, Westport, 148, Easton, 149, Woodstock, 150, Enfield, 151, Cannon, 152, Bridgewater, 153, Kent, 154, New Fairfield, 155,	Charles B. Clark, Beacon Falls, Avery M. Vail, West Goshen, Albert S. Talmadge, Prospect, Cyrus Sables, High Ridge, Arthur C. Bradley, Westport, J. Warren Stark, North Lyme, Joseph Adams, Westport, H. C. McCollam, Fairfield, Asa A. Hibbard, North Woodstock, Harry A. Gowdy, Scitico, Rev. Wm. E. Hooker, Wilton, H. W. Treat, Bridgewater, Gilbert A. Vincent, Kent, A. A. Brush, Danbury.	Fred Colvin, Beacon Falls, Alfred H. Wright, West Goshen, Mrs. Mary W. Phipps, Prospect, Mrs. Sarah E. Sables, High Ridge, Horace C. Hurlbutt, Westport, Fred. S. Fosdick, North Lyme, Edward C. Birge, Westport, G. S. Gillette, Bridgeport, Mrs. M. E. Ames, East Woodstock, Mrs. Nellie Bardwell, Shaker Station, Mrs. Della Sturges, Cannon, E. R. Wooster, Bridgewater, Mrs. Flora A. Judd, Kent, Miss Mary Satterlee, Danbury,	Miss Ella E. Wood, Beacon Falls. Mrs. Frances Sage, West Goshen. Miss Matilda L. Peterson, Prospect. Miss J. L. Gifford, Long Ridge. Archer C. Daniels, Hurlbutt. Jared S. Daniels, Hamburg. Miss B. I. Wakeman, Westport. P. G. McCollam, Bridgeport. Charles Killam, East Woodstock. Henry J. Bridge, Hazardville. Rev. E. A. Henderson, Cannon. Mrs. Mary B. Welton, Bridgewater. Wm. E. Page, Kent. Miss Emma Brush, Danbury.

OFFICIAL LIST OF FARMERS' CLUBS IN CONNECTICUT, 1900.

NAME OF CLUB.	PRESIDENT.	SECRETARY.
New Haven County,....	Prof. Wm. H. Brewer, .	Cullen B. Foote.
Green's Farms,	W. H. Burr,.....	J. Frank Elwood.
Greenwich,.....	S. R. Close,.....	G. A. Lockwood.
Newington,.....	H. A. Whittlesey,.....	J. S. Kirkham.
New Britain,	L. S. Wells,.....	.....

CONNECTICUT DAIRYMEN'S ASSOCIATION.

H. F. POTTER, *Pres't*, Montowese.GEO. E. MANCHESTER, *Sec'y*, Station A, Winsted.B. C. PATTERSON, *Treas.*, Torrington.

CONNECTICUT POMOLOGICAL SOCIETY.

N. S. PLATT, *Pres't*, New Haven.H. C. C. MILES, *Sec'y*, Milford.ROSWELL A. MOORE, *Treas.*, Kensington.

CONNECTICUT HORTICULTURAL SOCIETY.

A. C. STERNBERG, *Pres't*, West Hartford.L. H. MEAD, *Sec'y*, Keney Park Nursery, Hartford.W. W. HUNT, *Treas.*, Hartford.

CONNECTICUT JERSEY CATTLE BREEDERS' ASSOCIATION.

S. C. COLT, *Pres't*, Elmwood.R. A. POTTER, *Sec'y*, Bristol.B. W. COLLINS, *Treas.*, Meriden.

CONNECTICUT CREAMERY ASSOCIATION.

JOHN THOMPSON, *Pres't*, Melrose.FRANK AVERY, *Sec'y* and *Treas.*, Manchester.

CONNECTICUT SHEEP BREEDERS' ASSOCIATION.

R. S. HINMAN, *Pres't*, Oxford.JOHN H. WADHAMS, *Sec'y*, Goshen.

CONNECTICUT FORESTRY ASSOCIATION.

E. V. PRESTON, *Pres't*, Hartford.MISS MARY WINSLOW, *Sec'y* and *Treas.*, Weatogue.

BROWN SWISS CATTLE BREEDERS' ASSOCIATION.

HENRY D. LAUGHLIN, *Pres't*, Chicago, Ill.N. S. FISH, *Sec'y* and *Treas.*, Groton, Conn.

THE AUDUBON SOCIETY OF CONNECTICUT.

MRS. JAMES OSBORNE WRIGHT, *Pres't*, Fairfield.MRS. HELEN S. GLOVER, *Sec'y* and *Treas.*, Fairfield.

THE CONNECTICUT BEE-KEEPERS' ASSOCIATION.

CHARLES H. CHITTENDEN, *Pres't*, Killingworth.MISS ELLEN B. PECK, *Sec'y*, Clinton.

CONNECTICUT STATE POULTRY SOCIETY.

GEORGE B. FISHER, *Pres't*, Hartford. R. G. BAILEY, *Sec'y*, Hartford.

MERIDEN POULTRY ASSOCIATION.

L. E. COE, *Pres't*. JOSHUA SHUTE, *Sec'y*. W. B. HALL, *Treas.*

NEW HAVEN POULTRY ASSOCIATION.

EDWARD A. TODD, *Pres't*.W. R. KIRKWOOD, *Sec'y*.EDW. L. JONES, *Treas.*

REPORT OF THE TREASURER.

CHAS. A. THOMPSON, *in account with*

CONNECTICUT BOARD OF AGRICULTURE.

			DR.	CR.
1899.				
July	1.	By cash in treasury,		\$1,673.51
"	27.	To N. S. Platt,	\$16.53	
1900.				
Jan.	4.	" T. S. Gold,	600.00	
"	"	By State appropriation,		3,500.00
"	"	To Frederick Doolittle,	13.37	
"	"	" Seaman Mead,	20.20	
"	"	" G. H. Bowker & Co.,	331.15	
"	"	" E. M. Smith,	42.00	
"	6.	" Dr. E. H. Jenkins,	7.75	
"	"	" H. P. Hedges,	46.96	
"	"	" Frank M. Chapman,	31.20	
"	"	" R. S. Hinman,	14.20	
"	"	" Mrs. Nellis H. Sherwood,	28.00	
"	"	" Prof. A. B. Peebles,	20.34	
"	"	" Geo. R. Bradley,	10.25	
"	"	" Rev. R. W. Stimson,	30.08	
"	"	" Prof. L. H. Bailey,	50.35	
"	8.	" C. A. Thompson,	40.74	
"	"	" Chas. E. Chapman,	30.69	
"	"	" Prof. W. H. Brewer,	26.00	
"	"	" The Case, Lockwood & Brainard Co.,	345.03	
"	10.	" Col. James Wood,	30.58	
Feb.	4.	" I. C. Fanton,	8.58	
"	"	" N. G. Williams,	7.41	
"	"	" Chas. F. Roberts,	75.00	
"	"	" Dr. W. C. Sturgis,	4.35	
Apr.	24.	" Maude K. Wheeler,	6.68	
"	"	" I. C. Fanton,	3.00	
"	"	" Dr. N. S. Mayo,	21.50	
"	"	" Connecticut Agricultural College,	1.50	
"	"	" W. C. Sturgis,	3.70	
"	"	" C. S. Phelps,	18.02	
"	"	" B. F. Koons,	3.95	

Apr. 24.	To E. H. Jenkins,	.	.	.	.	\$5.25
" "	" A. C. Gilbert,	.	.	.	.	3.92
" "	" Hartford Engraving Co.,	.	.	.	.	43.66
" "	" Prof. A. B. Peebles,	.	.	.	.	5.05
" "	" F. H. Stadtmueller,	.	.	.	.	7.29
" "	" H. S. Patterson,	.	.	.	.	1.60
" "	" E. C. Birge,	.	.	.	.	3.81
" "	" H. G. Manchester,	.	.	.	.	15.08
" "	" Connecticut Agricultural College,	.	.	.	.	2.50
July 2.	" W. A. Stocking, Jr.,	.	.	.	.	5.88
" "	" T. S. Gold,	.	.	.	.	759.56
" "	" C. A. Thompson,	.	.	.	.	33.54
" "	" James F. Brown,	.	.	.	.	42.47
" "	" I. C. Fanton,	.	.	.	.	6.00
" "	" E. G. Seeley,	.	.	.	.	19.45
" "	" E. J. Miner,	.	.	.	.	11.21
" "	" Seaman Mead,	.	.	.	.	12.25
" "	" Edmund Halladay,	.	.	.	.	10.70
" "	" Balance amount in treasury,	.	.	.	.	2,295.18
						<hr/>
						\$5,173.51 \$5,173.51

HARTFORD, CONN., July 2, 1900.

We hereby certify that we have examined the above account with the accompanying vouchers and find them correct.

SEAMAN MEAD,
 FREDERICK DOOLITTLE, } *Auditors.*
 E. JUDSON MINER,

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State of Connecticut.

PUBLIC DOCUMENT, No. 32.

TENTH REPORT

OF THE

DAIRY COMMISSIONER,

MADE TO THE

GOVERNOR, A. D. 1900.

FOR THE

YEAR ENDING SEPTEMBER 30, 1900.

ORDERED PRINTED BY THE LEGISLATURE.

MERIDEN, CONN.:

JOURNAL PUBLISHING COMPANY.

1900.

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State of Connecticut,
DAIRY COMMISSIONER'S OFFICE,

ROOM 54, CAPITOL, HARTFORD.

TELEPHONE CALL, 1303.

JOHN B. NOBLE,

Commissioner.

ROBERT O. EATON,

Deputy Commissioner.

MISS B. WINONA PAGE,

Clerk and Stenographer.

REPORT.

To His Excellency George E. Lounsbury, Governor of the State of Connecticut :

SIR :—I have the honor to present to you my report for the fiscal year ending September 30, 1900.

LAWS.

The different laws under which this department work are :

First.—The law relating to the manufacture and sale of imitation butter.

Second.—The law relating to the sale of tub butter.

Third.—The law relating to the manufacture and sale of vinegar.

Fourth.—An act relating to the sale of adulterated molasses.

Fifth.—An act concerning the regulation of the sale of concentrated commercial feeding stuffs.

Sixth.—The law relating to the manufacture and sale of food products.

LAW RELATING TO THE MANUFACTURE AND SALE OF IMITATION BUTTER.

SECTION 2614. Any article resembling butter in appearance and not made wholly, salt and coloring excepted, from the milk of cows, shall be imitation butter within the meaning of this chapter. The words "butter," "dairy," or "creamery" shall form neither the whole nor a part of the name of any imitation butter, nor appear upon any article, or upon any box, tub, or package containing imitation butter.

SEC. 2615. No person, by himself or his agents or servants, shall render or manufacture, sell, offer for sale, expose for sale, take orders for the future delivery of, or have in his possession with intent to sell, any article, product, or compound made wholly or partly out of any fat, oil, or oleaginous substance or compound thereof, not produced from unadulterated milk or

cream from the same, which shall be in imitation of yellow butter produced from pure unadulterated milk or cream from the same ; *provided*, that nothing in this act shall be construed to prohibit the manufacture or sale of oleomargarine in a separate and distinct form and in such manner as will advise the consumer of its real character, free from coloration or any ingredient that causes it to look like butter. No imitation butter shall be sold or exposed for sale or delivered, except under the following conditions : First, the seller shall maintain in plain sight, over or next the main outer entrance of the premises where the selling is done, a sign bearing in plain, black Roman letters, not less than two inches wide and four inches long, on a white ground, the words " sold here," preceded by the name of the imitation article. If the selling is done from a wagon or other vehicle, such vehicle shall conspicuously bear upon its outside, on both sides of such wagon or vehicle, such a sign. If the delivering is done from a wagon or other vehicle, such vehicle shall conspicuously bear upon its outside, on both sides of said wagon or vehicle, a sign bearing in plain black Roman letters, not less than two inches wide and four inches long, on a white ground, the words, " delivered here," preceded by the name of the imitation article. Second, all imitation butter shall be kept in an enclosing package, which shall bear on the outside of its body, and also of its cover, at all times in plain sight of a beholder of the package, in black Roman letters, not less than one inch wide and two inches long, on a white or light-colored ground, the name of the imitation article. Third, the seller shall orally inform each buyer at each sale that the article he buys is not butter, and shall give the buyer the name of the imitation article. Fourth, every person, copartnership or corporation selling or offering for sale any imitation butter, and every keeper of a hotel, boarding-house or restaurant, temporary or permanent, who shall furnish any guest with any imitation butter, or food containing it, shall, within fifteen days after the passage of this act, or within fifteen days after commencing said business, and annually on the first day of May, or within fifteen days thereafter, register in a book kept by the Dairy Commissioner for that purpose, the name and the town, street and number of street, of the place of business of said person, co-partnership, corporation, keeper of a hotel, boarding-house or restaurant. All signs prescribed in sections 2615, 2616 and 2617 of the general statutes shall be provided by the Dairy Commissioner, and all signs required under provisions of section 2615 of the general statutes, to be maintained in plain sight over or next the main outer entrance of the premises where the selling is done, shall be placed in position under the direction of the Dairy Commissioner or his deputy. All signs so furnished by the Dairy Commissioner shall be paid for by the parties receiving the same, the same to be furnished at the actual cost thereof.

SEC. 2616. No baker or vender of food shall sell or expose for sale any article of food containing imitation butter unless such baker or vender shall maintain the same kind of a sign as hereinbefore first prescribed, in the way and manner prescribed in that connection, except that the word

"used" shall be substituted for the word "sold." If the selling be done from a wagon, or other vehicle, such vehicle shall conspicuously bear such a sign.

SEC. 2617. No keeper of a hotel, boarding house or restaurant, temporary or permanent, shall furnish any guest with any imitation butter, or food containing it, unless such keeper shall maintain in plain sight of all guests sitting at tables where food is served such a sign or signs as hereinbefore prescribed, except that the word "used" shall be substituted for the word "sold."

SEC. 2618. The Governor shall appoint a citizen of the State as a Dairy Commissioner, who shall hold office for two years from and after the first day of May succeeding his appointment, and until his successor is appointed, unless sooner removed by the Governor for cause; and in case of his death, resignation or removal, the Governor shall fill the vacancy. It shall be the duty of the Dairy Commissioner to attend to the enforcement of this chapter throughout the State. A room in the Capitol shall be set apart for the Dairy Commissioner. He may appoint and remove a deputy, who may also act as clerk. The Dairy Commissioner and his deputy shall have free access, at all reasonable hours, for the purpose of examining into any suspected violation of this chapter, to all places and premises, apartments of private families, keeping no boarder excepted, where the Dairy Commissioner or his deputy suspects imitation butter to be made, sold, used, kept or stored in transit, and on tender of the market price of good butter for the same may take from any person, firm or corporation samples of any articles suspected to be imitation butter. And it shall be the duty of agents of railroad and express companies having knowledge or record of any consignment of imitation butter to inform the Commissioner or his deputy of such consignment, and the name of the consignee, when requested by said Commissioner or his deputy. The Dairy Commissioner may have samples suspected to be imitation butter analyzed at the Connecticut Experiment Station, or by any State Chemist, and a sworn or affirmed certificate after analysis shall be *prima facie* evidence of the ingredients and the constituents of the samples analyzed. Any one refusing the Dairy Commissioner or his deputy access in a reasonable manner, and at a reasonable time, to premises for said purpose of examination, or refusing to seal samples as hereinbefore provided for, shall incur the penalty herein after first provided for violations of this chapter. The Dairy Commissioner shall make an annual report to the Governor, and such annual report shall be submitted to the general assembly at its regular session.

SEC. 2619. Any person violating any of the provisions of sections 2614, 2615 or 2616, and any person, except a boarding house keeper, violating section 2617 shall for the first offense be fined not more than one hundred dollars or imprisoned not more than sixty days, or both; for any subsequent offense said fine and imprisonment shall be doubled. Any boarding-house keeper violating section 2617 shall for the first offense be

fined twenty-five dollars or imprisoned not exceeding thirty days, or both; for any subsequent offense said fine and imprisonment last mentioned shall be doubled. Evidence of any violation of this chapter shall be *prima facie* evidence of willful violation with knowledge.

Approved May 18, 1893, March 28, 1895.

OLEOMARGARINE.

As in the past years since 1886, the work necessary to be done under the law relating to the manufacture and sale of imitation butter is one of the most important under this department. The large decrease in the amount sold in this State since the passage of the first law in 1886 and the strong law of 1895 is proof of the necessity of such a law, and shows conclusively that the law was well drawn and will accomplish the object desired.

The amount of oleomargarine sold the past year in Connecticut is very small compared to the large amount sold at the time the first law was passed. We have five licensed dealers in the State, and they are selling white oleomargarine according to the law. The amount reported as sent into the State is much larger than the quantity represented by the sales of these dealers. There are large corporations who are using quite a large amount each year in their own business, and these people are not amenable to the law, as they do not sell it. Institutions are also using quite a large amount, and there is no law which forbids or prohibits it.

As in years past, careful watch has been kept in all parts of the State to see that the law is not violated, for there is quite an inducement when butter is high in price to sell yellow oleomargarine to take the place of butter.

Several prosecutions have been made during the year. We have, as stated in previous reports, known that large quantities were being shipped into the city of Waterbury. Late in December, 1899, a careful inspection of hotels and boarding houses in Waterbury and other cities was made and all of their butter sampled. In Meriden it was found that an agent was taking orders and selling oleomargarine to hotels and restaurants. Prosecution was brought and the business was stopped. In Waterbury we found that an agent from a Providence factory was selling oleomargarine, and six

hotel and restaurant keepers were prosecuted and fined. The agent was also prosecuted and fined fifty dollars and costs.

Early in January, the present year, we found that a new butter store had been opened in Bridgeport. Samples of their butter were soon taken, and it was found that oleomargarine was kept there and was sold to many customers for butter. The parties were at once prosecuted, convicted, and fined sixty dollars and costs.

On June 6th we found that a quantity of oleomargarine had arrived in Waterbury. We searched the stores where it was sold under license, but did not find any but the white, but on further search in a cellar of an undertaker, adjoining the butter stores, sixty fifty-pound tubs of oleomargarine were found secreted behind coffin boxes and caskets. No one professed to know where it came from and what it was there for. The butter dealer and undertaker were both prosecuted, and the butter dealer paid the maximum fine of one hundred dollars and costs, and there has been little sold there since.

Examination in other parts of the State show that while there has been some used by private families who have bought it from the factory in ten pound tubs, there has been very little sold contrary to law, wherever this has been attempted parties have been prosecuted and the sale stopped.

The manufacture and sale of Oleomargarine has grown to a business of large magnitude in the country within the last few years. Great corporations in the west are manufacturing large quantities and there are three factories in the adjoining State of Rhode Island. The largest amount is manufactured in the first Illinois district, which produced nearly forty million pounds or about 47 per cent. of the total. The total amount manufactured in 1899 was 83,129,961 pounds. Of this over 18,500,000 pounds went to Illinois, to Pennsylvania about 11,600,000 pounds, to Ohio almost 9,000,000 pounds, to New Jersey nearly 6,000,000, to Indiana, Rhode Island, Missouri between three or four million pounds each, to Michigan and Massachusetts between two million and three million pounds each. Two million pounds went to each of several of the other States.

The following table shows the amount manufactured from the year 1887 to 1899:

TABLE 1.

PRODUCTION AND DISTRIBUTION OF OLEOMARGARINE AND TOTAL
REVENUE RECEIPTS THEREFROM, 1887 TO 1899.

Fiscal year ended June 30.	Quantity Produced.	Withdrawn, tax paid. <i>a</i>	Withdrawn, for export. <i>b</i>	Received, all sources.
	<i>Pounds.</i>	<i>Pounds.</i>	<i>Pounds.</i>	<i>Dollars.</i>
On hand Nov. 1, 1886...	182,000			
1887 (from Nov. 1, 1886)...	21,513,537	20,743,569	724,532	723,948.04
1888.....	34,325,527	31,589,165	1,689,198	864,139.88
1889.....	35,664,026	33,863,642	1,748,895	894,247.91
1890.....	32,324,032	30,797,935	1,618,397	786,291.72
1891.....	44,292,409	42,215,512	1,229,116	1,077,924.14
1892.....	48,364,155	46,915,501	1,295,782	1,266,326.00
1893.....	67,228,298	64,463,775	2,785,494	1,670,643.50
1894.....	69,622,246	66,096,058	3,406,683	1,723,479.90
1895.....	56,958,105	53,636,242	3,337,186	1,409,211.18
1896.....	50,853,234	47,741,793	3,106,204	1,219,432.46
1897.....	45,531,293	42,508,469	3,148,407	1,034,129.60
1898.....	57,516,136	55,079,887	2,259,705	1,315,708.54
1899.....	83,139,901	79,701,108	3,095,738	1,956,618.56
Total	647,609,989	616,352,756	29,442,337	15,942,101.43

a Two cents per pound.

b Without tax.

There can be no question but what a considerable amount of this product is sold as butter in several of the States, and as this increased production is a menace to the dairy interests of the country, constant effort must be made to hold it in check. We have in this country over five million farmers, with an annual cash value of the products on the farm of six hundred million dollars, and the dairy interests represented make up a very large part of this amount, but it is not the producer of dairy products alone who is interested in this question. The large number of consumers in our own State and throughout the country are defrauded and swindled if they purchase this cheap substitute when they suppose that they are paying their good money for pure butter.

THE GROUT BILL.

In order to throw still stronger guards around the manufacture and sale of oleomargarine, House Bill No. 3717, known as the Grout Bill, was presented to Congress during the last session. Strong efforts were made to pass this bill, but it was finally postponed and will come up for action on the 6th of December next. The first section provides that all counterfeit substitutes for butter, when taken into any State or Territory shall be subject to the laws of that State or Territory concerning such counterfeit substitutes, the same as the Wilson law in regard to liquors, enacted in 1891. The second section provides that on all oleomargarine which stands in its own color, and not in the semblance of butter, the federal tax shall be reduced to one-fourth of one per cent. per pound. That this bill should be strong and forcible, the second section also provides that on all oleomargarine colored in semblance of butter, a tax of ten cents a pound shall be imposed. If this bill should become a law, of course it will materially increase the price at which oleomargarine can be sold if colored, and the deceptive sales and fraudulent competition with the legitimate dairy industry will be greatly modified.

DAIRY INTERESTS IN THE UNITED STATES.

The growth of the dairy industry in our country has been very great since 1840, when the first census of milch cows was taken. In many of the large western states which were formerly almost entirely beef producing, the number of milch cows has increased very rapidly. It is estimated that at the close of the century we have in round numbers seventeen million cows. These are somewhat unevenly distributed over the country. New York and Iowa lead with about 1,500,000 each; Pennsylvania, Illinois and Wisconsin with 1,000,000 each; Ohio, Indiana, Minnesota, Missouri, Kansas and Nebraska with over 500,000 each; Texas has over 700,000, but many of these are not first-class dairy cows. In the west and northwestern states butter is the chief dairy product. In the eastern and middle states the butter product is of great importance, although a large portion of the milk is consumed in supplying the large towns and cities.

The following table shows the estimated number of cows and quantity and value of dairy products at the close of the century.

ESTIMATED NUMBER OF COWS AND QUANTITY AND VALUE OF
DAIRY PRODUCTS.

Cows.	Product.	Rate per Cow.	Total Product.	Rate of Value.	Total Value.
11,000,000	Butter.	130 pounds.	1,430,000,000	*18 cents.	\$257,400,000
1,000,000	Cheese.	300 pounds.	300,000,000	9 cents.	27,000,000
5,000 000	Milk.	380 gallons.	2,090,000,000	8 cents.	167,200 000

This gives a grand total of the dairy products of our country at nearly five hundred million dollars, counting the skim milk, butter milk and calves dropped. There are about eleven thousand creameries and cheese factories in the United States. Nearly all the cheese is factory made, but a large portion of the butter is still made upon the farm and in private dairies. The above figures certainly show the commercial importance of dairying in the United States and give good reason to take all justifiable measures for protecting its interests.

DAIRY INTERESTS OF CONNECTICUT.

Dairying in Connecticut at the present time is one of the most important branches of our agricultural interests. In the western part of the State large herds of cows are kept and the milk shipped to New York city. In the eastern part many of the farmers are sending milk to Providence and Boston. In other portions of the State the consumption of whole milk is large. While the milk trade is an important part of our dairying, the butter business is on many accounts of still more importance. The fifty-six creameries in the State are most of them doing a good business, and some of them are quite large. They are making a first-class grade of butter, and it finds a ready market at a good remunerative price. Quite a large amount of butter is still made in private dairies and much of it is of extra good quality. In the last fifty years the number of cows in Connecticut has increased from 85,461 to nearly 150,000,

with an average value at the present time of \$34.80 each. The increase in numbers does not represent nearly all the increase in the business, for much better cows are now kept and more care and thought is given to breeding and feeding. The average milk production per cow has increased in the past forty years from two hundred and seventy gallons to four hundred and thirty gallons per cow. The amount of butter made in the State has increased in the past fifty years from 6,498,119 pounds to about 11,000,000 pounds. Dairymen in Connecticut are, as a rule, thoroughly alive to their business, intelligent, and progressive men, and through their efforts much has been accomplished in bringing their business to a more satisfactory standing, and they, together with all the consumers of dairy products in the State, should have all justifiable encouragement and protection.

CONNECTICUT DAIRYMEN'S ASSOCIATION.

The Connecticut Dairymen's Association was incorporated in 1889 for the purpose of helping the dairy and all of its related interests. Good results have followed all of the efforts put forth by this Association. The annual meeting is held the third week in January at Hartford, where prominent dairymen from different parts of the country speak upon live questions connected with their business. There is also a large exhibit of dairy products from private dairies and many of the creameries. Institutes and field meetings are also held in different parts of the State for the purpose of disseminating knowledge and increasing the interest.

The attendance at the annual meeting is always large and great interest is manifested. The officers of the Association for 1900 are:

President—J. B. Noble, East Windsor.

Vice-President—H. F. Potter, Montowese.

Secretary—George E. Manchester, West Winsted.

Treasurer—B. C. Patterson, Torrington.

DIRECTORS.

J. G. Schwink, Jr., Meriden.	H. O. Averill, Washington Depot.
Richard B. Eno, Weatogue,	Harry T. Minor, Vernon.
I. W. Stark, Lebanon,	E. C. Birge, Southport.
C. B. Pomeroy, Jr., Willimantic.	Richard Davis, Middletown.

CREAMERIES OF THE STATE.

Statistics have been courteously given by the managers of the creameries of the State which enable me to present the following tabulated statement in regard to their business for the year. The location of the different creameries is shown by the accompanying map.

	Name.	Situation.	Co-operative or Proprietary.	Amount of Capital.
1	Andover,	Andover,	Co-operative,	\$4,000
2	Aspetuck,	Northville,	Co-operative,	1,500
3	Avon,	Avon,	Co-operative,	4,000
4	Brooklyn,	Brooklyn,	Co-operative,	
5	Canton,	Canton Center,	Co-operative,	3,675
6	Chapinville,	Chapinville,	Proprietary,	
7	Cheshire,	Cheshire,	Proprietary,	2,000
8	Clover Farms,	Redding,		
9	Colchester,	Colchester,	Co-operative,	3,750
10	Cromwell,	Cromwell,	Co-operative,	3,500
11	Danbury,	Danbury,	Proprietary,	3,000
12	Durham,	East Walingford,	Co-operative,	2,000
13	East Canaan,	East Canaan,	Co-operative,	3,500
14	Eastford,	Eastford,	Co-operative,	2,975
15	East Granby,	East Granby,	Co-operative,	3,000
16	East Haddam,	Goodspeeds,	Co-operative,	3,950
18	Echo Farm,	Litchfield,	Proprietary,	100,000
19	Ellington,	Ellington,	Co-operative,	4,850
20	Elmwood,	Elmwood,	Private,	
21	Farmington,	Farmington,	Co-operative,	3,975
22	Glastonbury,	Glastonbury,	Proprietary,	3,700
23	Golden Ridge,	Berlin,	Co-operative,	3,000
24	Goshen,	West Goshen,	Co-operative,	3,000
25	Granby,	Granby,	Co-operative,	3,550
26	Green's Farms,	Westport,	Co-operative,	
27	Highland,	West Hartford,	Co-operative,	3,800
28	Jewett City,	Griswold,	Co-operative,	3,600
29	Lebanon,	Lebanon,	Co-operative,	3,400
30	Mansfield,	Merrow,	Co-operative,	3,600
31	Mountain Spring,	Durham,	Proprietary,	
32	Northford,	Northford,	Proprietary,	2,800
33	Oak Shade,	Cheshire,	Proprietary,	2,000
34	Old Lyme,	Black Hall,	Proprietary,	3,000
35	Plainville,	Plainville,		
36	Ridgefield,	Ridgefield,		

37	Riverside,	Warehouse Point,	Co-operative,	4,000
38	Riverside,	Higganum,	Private,	
39	Scotland,	Scotland,	Co-operative,	1,800
40	Simsbury,	West Simsbury,	Co-operative,	2,500
41	Somers,	Somers,	Co-operative,	4,500
42	South Britaln,	South Britain,	Proprietary,	5,000
43	Spring Brook,	South Wethersfield,	Co-operative,	3,000
44	Suffield,	Suffield,	Co-operative,	5,500
45	Taugwank,	No. Stonington,	Co-operative,	3,000
46	Thompson,	Thompson,	Proprietary,	3,000
47	Torrington,	Torrington,	Proprietary,	400
48	Tunxis,	Robertsville,	Co-operative,	3,000
49	Turnerville,	Turnerville,	Private.	
50	Valley Farm,	New Haven,	Proprietary,	20,000
51	Vernon,	Rockville,	Co-operative,	3,675
52	Wallingford,	Wallingford,	Co-operative,	4,400
53	Wapping,	South Windsor,	Co-operative,	3,500
54	Windsor,	Windsor.	Co-operative,	7,000
55	Winsted,	Winsted,	Proprietary,	2,000
56	Woodstock,	Woodstock,	Co-operative,	3,000
57	Neds Brook,	Canton,	Co-operative,	1,000

PRESENT BOARD OF OFFICERS AND SUPERINTENDENTS.

- 1 President and Superintendent, E. P. Skinner; Secretary, E. M. Yeomans; Butter Maker, J. M. Copley.
- 2 President, E. O. Sperry; Secretary and Superintendent, V. B. Hatch; Butter Makers, Geo. W. Hill and Joe Devaux.
- 3 President, C. R. Woodford; Secretary, Superintendent and Butter Maker, H. M. Lyman.
- 4
- 5 President, E. N. White; Secretary and Superintendent, B. F. Case; Butter Maker, J. H. Crowley.
- 6 Proprietors, Robert and Herbert Scoville; Manager, L. P. Ashman;
- 7 President, H. Doolittle; Secretary, E. Beadle; Superintendent, Ed. Skinner; Butter Maker, R. Newton;
- 8
- 9 President, J. E. Hall; Secretary, S. E. Williams; Superintendent, Wm. P. Adams; Butter Maker, D. C. Gillette.
- 10 President, Henry Gilbert; Secretary and Superintendent, E. D. Hammond; Butter Maker, E. T. Griggs.
- 11 Superintendent and Butter Maker, L. H. Boughton.
- 12 President, C. R. Clark; Secretary, C. F. Bartholomew; Superintendent and Butter Maker, Benjamin Page.
- 13 President, C. H. Sage; Secretary and Superintendent, E. S. Roberts; Butter Maker, D. E. King.

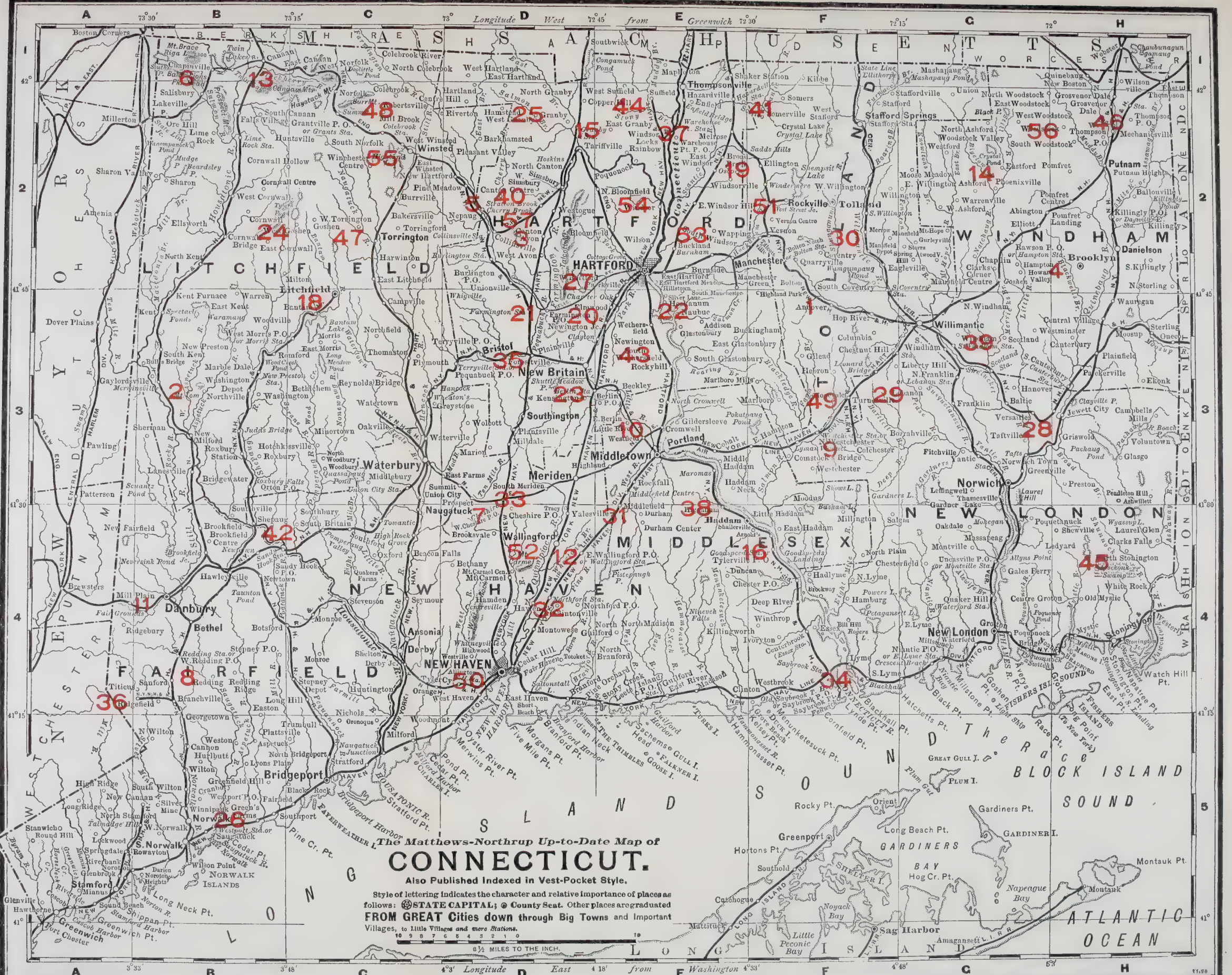
- 14 President, S. O. Bowen; Secretary and Treasurer, C. M. Jones.
15
16 President, S. B. Warner; Treasurer and Superintendent, L. M. Stark,
17
18 President, John S. Palmer; Secretary and Treasurer, A. B. Webster.
19 President and Superintendent, John Thompson; Secretary, J. T. Mc-
Knight; Butter Makers, John M. Allen and Howard Loveland.
20
21 President, C. W. Lewis; Secretary and Superintendent, H. W. Barbour;
Butter Maker, Simeon Hart.
22 President, E. H. Andrews; Secretary, H. E. Loomis; Butter Maker,
H. L. Lothrop.
23 President, W. H. Webster; Secretary and Superintendent, F. Deming;
Butter Maker, W. C. Hills.
24 President and Superintendent, H. H. Ives; Secretary, W. H. Wadhams;
Butter Maker, Ira J. Padgett.
25. President, G. O. Beach; Secretary, S. F. Holcombe; Superintendent,
H. J. Dewey; Butter Maker, O. B. Cotton.
26
27 President, Franklin Sisson; Secretary and Superintendent, Timothy
Sedgewick; Butter Maker, A. J. Hunt.
28 President, E. A. Geer; Secretary, Superintendent and Butter Maker,
B. W. Smith.
29 President, A. G. Kneeling; Secretary and Superintendent, N. Manning;
Butter Maker, E. L. Pultz.
30 President, J. R. Hall; Superintendent, John Brown.
31 Proprietor, Henry Page; Butter Maker, F. H. Page.
32 President, T. A. Smith; Secretary, D. M. Foote.
33
34
35 President, A. Corbin; Secretary and Superintendent, H. Carter; Butter
Maker, L. P. Lauridson.
36 Proprietor, A. Blochmann.
37 President and Superintendent, C. T. Abbe; Secretary, Horace Patten;
Butter Maker, H. B. Conger.
39 President, R. T. Haskins; Secretary, Wm. I. Anthony; Superintendent
and Butter Maker, E. B. Inman.
40 President, A. L. Latimer; Secretary and Superintendent, S. T. Stock-
well; Butter Maker, A. L. Vincent.
41 President, M. P. Avery; Secretary and Superintendent, E. B. Little;
Butter Maker, Wm. H. Daniels.
42 President, Hollister Sage.
43 President, S. W. Robbins; Vice-President, S. N. Wells; Secretary and
Treasurer, George W. Harris.
44 President, Arthur Sikes; Secretary, Geo. F. Kendall; Superintendent,
E. A. Russell; Butter Maker, E. C. Stratton.

- 45 President, C. H. Maine; Secretary, W. H. Hillard; Superintendent, B. F. Wheeler; Butter Maker, D. E. Johnson.
- 46 Proprietor, L. A. Lougee.
- 47 President, G. C. Ives.
- 48 President, Arthur B. Ferry; Secretary and Superintendent, H. P. Deming; Butter Maker, F. W. Moore.
- 49 President, etc., P. W. Turner & Co.,
- 50 Butter maker, John Johnson.
- 51 President, A. O. Thall; Secretary, Superintendent and Butter Maker, A. W. Znniss.
- 52 P. J. Boland.
- 53 President, C. M. Johnson; Secretary, C. J. Dewey; Superintendent, Frank Avery; Butter Maker, W. M. Foster.
- 54 President, H. H. Ellsworth; Secretary, I. N. Hayden; Butter Maker, Sidney Barnard.
- 55 President, E. Manchester & Sons.
- 56 President, Abel Child; Secretary, G. H. Sumner; Treasurer, L. A. Cutten; Superintendent, Abel Child.
- 57 President, James Case; Secretary and Butter Maker, J. M. Gladwin.

	No. of patrons.	No. cows.	No. of lbs. cream received past year.	Am't paid patrons past year.	Average price paid patrons for butter fat.	Average price rec'd for butter per lb.
1	68					
2	110		520,717	\$22,395 42	.22 ½	.22 ½
3						
4						
5	97		540,889	23,799 30	.26.1	.24.9
6						
7	12	85	82,317	1,803 02		
8						
9	44	300	254,453	10,520 93	.22.68	.25
10	59	275	258,166	11,096 00	.23 ½	.25.56
11	8	190		9,891 16	.27	
12	26	325		14,414 14	.26	.27
13	67	600	363,639	15,021 15	.23.56	.24.62
14						
15						
16	60	410	236,620	10,367 28	.23.67	.24.63
17						
18	60	12		55,522 91		
19	102	1,500	774,621	34,328 00	.25.71 ^m	.25.38
20						
21	12		Spaces.			
22	44		288,493	7,255 61		.23 ½
23	40	300	274,000	12,406 00	.24.8	.24.2

DAIRY COMMISSIONER'S REPORT.

	No. of patrons.	No. cows.	No. of lbs. cream received past year.	Am't paid patrons past year.	Average price paid patrons for butter fat.	Average price rec'd for butter per lb.
24	58		515,452	22,919 14	.25.70	.22.10
25	185	1,000	217,966	39,000 00	.23.5-48	.21.97
26						
27						
28	40		288,752	12,828 72	.23.58	.25.56
29	162		1,299,796	56,116 65	.24	.25
30						
31		46				.27.¾
32						
33						
34						
35	45	325		11,731 65		.24.60
36	25	150	200,000	7,670 00	.22	.24
37	54	300		13,442 28		.25.5
38						
39	35	275	194,166	7,558 75	.22¼	.23.62
40	62	600	388,285	18,904 65	.25¼	.23.6
41	62	600	425,000	21,000 00	.26	.26.33
42	45	600			.23	.25.
44	97	750	626,188	27,518 64	.23.88	.24.
45	30	250	209,866	10,569 97	.22½	.25
46						
47						
48	102	700	570,396	32,295 95	.25 ³ / ₁₀	.23.65
49						
50	55					.28
51	50		325,952	15,156 16	.25.90	.25.09
52	111	1,000	870,881	42,994 99	.26.17	.22.18
53						
54	58	500	396,177	15,132 46	.21.4	.25
55	3	90				
56	75		445,000	21,529 37	.25	.25



The Matthews-Northrup Up-to-Date Map of CONNECTICUT.

Also Published Indexed in Vest-Pocket Style.

Style of lettering indicates the character and relative importance of places as follows: **STATE CAPITAL**; **County Seat**. Other places are graduated **FROM GREAT CITIES DOWN THROUGH Big Towns and Important Villages, to Little Villages and more Stations.**

10 9 8 7 6 5 4 3 2 1 0

3/4 MILES TO THE INCH.

ANNUAL REPORT
OF
THE WAPPING CREAMERY CO.,

For the year ending December 31, 1899.

RESOURCES

Cash balance.....	\$2,899 12
Bills receivable.....	4,879 59
Butter, 125 pounds.....	37 50
Supplies.....	62 60
Ten months' insurance.....	24 43
In process of manufacture.....	443 00
In savings bank.....	248 37
	<hr/>
	\$8,593 61

LIABILITIES.

Cream for November.....	\$3,666 64
Cream for December.....	3,886 40
Six months' interest due.....	105 00
Express.....	21 66
Employes for December.....	419 82
Coal.....	20 00
Balance Credit.....	474 09
	<hr/>
	\$8,593 61

TREASURER'S REPORT.

FRANK AVERY, Treasurer.

DR.

January 2, 1899, Cash Balance.....	\$2,386 96
Cash Received, Twelve Months.....	50,421 39
	<hr/>
	\$52,808 35

CR.

Cash Paid Out, Twelve Months	\$49,909 23
Cash in Treasury, December 31, 1899.....	2,899 12
	<hr/>
	\$52,808 35

Cream gathered	870,881 pounds.
Average butter fat in cream	18.86 per cent.
Butter fat	164,252 pounds.
Average butter fat in butter.....	84.7 per cent.
Butter made, largest amount made in one year....	193,778 pounds.
Butter, cost per pound to manufacture and market .	.0363 cents.
Paid patrons for butter fat.....	.2617 cents per pound
For butter .....	.2218 per pound.
Cream for one pound butter.....	4.49 pounds.
Total sales.....	\$50,057 80
Paid to patrons.....	42,994 99
Paid to employees	5,057 02
Paid other expenses	1,982 99
Number of patrons.....	111

REPAIRS AT CREAMERY DURING YEAR.

Box, Churn and Fittings	\$75 54
Fixing Work Room	60 28
Painting Inside.....	16 65
Relaying Wall in Shed.....	12 00

M. H. TALCOTT, }
 C. J. DEWEY, } Auditors.

REPORT
OF
THE GLASTONBURY CREAMERY CO.

For the year 1899.

DIRECTORS

E. H. ANDREWS,
J. S. WILLIAMS,
JOHN E. TYRON,

N. S. BAILEY.

C. G. CRITTENDEN,
E. M. KEENE,
JOHN LOOMIS,

ADDITIONAL DIRECTORS

J. S. WILLIAMS,

E. M. KEENE.

OFFICERS

E. H. ANDREWS, President and Manager,

H. E. LOOMIS, Secretary and Treasurer,

H. W. LATHROP, Butter Maker.

ANNUAL MEETING—FIRST MONDAY IN MARCH.

DIRECTORS' REGULAR MEETING—FIRST MONDAY IN EACH MONTH.

1899.	Number of Patrons.	Number of Spaces Received.	Number of Pounds of Butter Made.	Number of Spaces per Pound.	Cts. Paid per Space.	Equivalent to cts. per lb.	RECEIPTS.			PAID.		
							For Butter	Butter-Milk, Cream, and Incid.	Total.	Patrons.	Expenses.	Total.
JANUARY	44	28,042	4,105	6.83	2.6	17.75	\$932.22	\$15.98	\$948.20	\$729.09	\$232.51	\$961.60
FEBRUARY	42	26,411	3,810	6.93	2.5	17.32	855.58	17.76	873.34	660.27	235.23	895.50
MARCH	43	28,094	4,047	6.94	2.4	16.65	893.84	20.35	914.19	674.25	239.39	913.64
APRIL	39	23,763	3,518	6.75	2.4	16.20	773.96	14.92	788.88	570.31	224.47	794.78
MAY	37	29,631	4,443	6.67	2.5	16.67	938.03	23.65	961.68	740.77	234.95	975.72
JUNE	35	26,625	3,963	6.72	2.1	14.11	792.80	14.23	807.03	559.52	256.44	815.96
JULY	34	23,469	3,454	6.79	2.2	14.93	777.05	15.44	792.49	516.31	254.38	770.69
AUGUST	34	21,649	3,084	7.28	2.4	17.47	771.00	12.85	783.85	519.57	260.36	779.93
SEPTEMBER	35	20,007	2,907	6.88	2.5	17.20	763.17	14.18	777.35	500.17	248.02	748.19
OCTOBER	35	19,357	2,700	7.1	2.8	19.88	756.10	12.30	768.40	542.00	226.00	768.00
NOVEMBER	35	20,006	2,767	7.15	3.	21.45	792.10	10.00	792.10	600.18	205.13	805.31
DECEMBER	35	19,357	2,972	7.21	3.	21.63	845.98	10.82	845.98	643.17	210.82	853.99
TOTAL,		288,493	41,770				\$9,871.01	\$182.48	\$10,053.49	\$7,255.61	\$2,827.70	\$10,083.31

CONNECTICUT CREAMERY ASSOCIATION.

President—John Thompson, Ellington.

Vice-President, Hiram Carter Plainville.

Sec. and Treas.—Frank Avery, Wapping.

DIRECTORS.

B. F. Case, Canton.

C. P. Reynolds, Jewett City.

E. D. Hammond, Cromwell.

D. E. Phelps, Windsor.

H. P. Deming, Robertsville.

Francis Deming, Berlin.

E. B. Little, Somers.

John Brown, Merrow.

STATE STANDARDS FOR DAIRY PRODUCTS, 1900.

The following table shows the requirements for articles sold under the names specified. States not named have no laws prescribing standards for dairy products.

STATES.	MILK			SKIM MILK. CREAM. BUTTER.			CHEESE.
	Total Solids, Per Cent.	Solids not Fat, Per Cent.	Fat, Per Cent.	Total Solids, Per Cent.	Fat, Per Cent.	Fat, Per Cent.	Fat, Per Cent.
California,	..	..	..	..	..	..	Full Cream, 30. Half Skim, 15½.
Colorado,	..	..	..	..	..	..	35 Total Solids & Fat.
Dist. of Columbia,	..	9	3.5	9.3	20	83	Not over 12 Water or 5 Salt.
Georgia,	..	8.5	3.5	..	..	..	..
Illinois,	12	..	3	..	15	80	48 Solids & Fat.
Indiana,	..	9	3	..	..	80	10 Milk Fats.
Iowa,	12.5	..	3	..	15	..	..
Maine,	12	..	3	..	..	..	..
Massachusetts,	13	9.3	3.7	9.3	..	..	..
April and Sept.,	12	9	3	..	..	..	..
Michigan.	12.5	..	3	..	..	..	..
	Sp. Gravity, 1,029.33.			Sp. Gravity, 1,032.37.			

DAIRY COMMISSIONER'S REPORT.

STATES.	MILK.			SKIM MILK. CREAM. BUTTER.			CHEESE.
	Total Solids, Per Cent.	Solids not Fat, Per Cent.	Fat, Per Cent.	Total Solids, Per Cent.	Fat, Per Cent.	Fat, Per Cent.	Fat, Per Cent.
Minnesota,	13	..	3.5	..	20	..	45 Fat.
Missouri,	..	..	..	..	..	..	From Milk, 3 Fat.
New Hampshire,	13	..	..	..	..	..	..
New Jersey,	12	..	..	..	..	..	..
New York,	12	..	3	..	..	..	..
North Dakota,	12	..	3	..	15	..	..
Ohio,	12	..	3	1	..	80	..
Oregon,	11	..	3	Sp. Gravity, 1,035	..	Not over 14 Water.	..
Pennsylvania,	12.5	9.25	3	Fat, 2.5.	..	..	Full Cream, 32. $\frac{3}{4}$ Cream, 24. $\frac{1}{2}$ Cream, 16.
Rhode Island,	12	..	2.5	..	..	..	..
South Carolina,	..	8.5	..	..	..	..	..
Utah,	..	..	..	9 Solids.	..	..	..
Vermont,	12.5	9.25	..	..	..	..	..
May and June,	12	..	..	..	..	..	..
Washington,	..	8	3	..	..	..	Full Cream, 30. Skimmed, 15.
Wisconsin,	..	..	3	..	..	..	..

NUMBER AND VALUE OF MILCH COWS.

The following table shows the number, average price, and total value of Milch Cows in the United States on January 1, 1900, by States.

States and Territories.	Number.	Milch Cows. Average price per head.	Value.
Maine	203,814	\$28 90	\$5,890,225
New Hampshire.....	135,457	32 70	4,429,444
Vermont.....	268 886	31 90	8,577,463
Massachusetts.....	181,589	37 20	6,755,111
Rhode Island.....	25,256	39 95	1,008,977
Connecticut.....	144,529	34 80	5,029,609
New York.....	1,487,416	35 20	52,357,043
New Jersey.....	223,261	39 10	8,729,505
Pennsylvania.....	970,473	33 15	32,171,180
Delaware.....	35,730	31 50	1,125,495
Maryland.....	154,712	29 80	4,610,418
Virginia.....	242,488	24 05	5,831,836
North Carolina.....	243,298	18 20	4,428,024
South Carolina.....	122,959	19 25	2,366,961
Georgia.....	285,431	23 95	6,836,072
Florida.....	113,108	16 76	1,888,904
Alabama.....	231,802	18 40	4,265,157
Mississippi.....	244,103	20 70	5,052,932
Louisiana.....	123,232	21 95	2,704,942
Texas.....	693,794	25 25	17,518,298
Arkansas.....	188,936	20 25	3,825,954
Tennessee.....	239,394	24 15	5,781,365
West Virginia.....	167,173	28 40	4,747,713
Kentucky.....	235 798	27 25	6,425,496
Ohio.....	780,939	32 30	25,224 330
Michigan.....	463,698	32 70	15,162,925
Indiana.....	605,855	33 75	20,447,606
Illinois.....	1,021,236	36 30	37,070 867
Wisconsin.....	1,003,321	33 60	33,711,586
Minnesota.....	672,540	31 65	21,285,891
Iowa.....	1,263,283	34 90	44,088,577
Missouri.....	659,731	28 60	18,868,307
Kansas.....	707,675	32 50	22,999,438
Nebraska.....	685,388	35 50	24,329,499
South Dakota.....	398,383	33 40	13,305,992
North Dakota.....	176,205	31 95	5,629,750
Montana.....	45,314	39 25	1,778,574
Wyoming.....	18,104	40 55	734,117
Colorado.....	93,499	36 20	3,384,664
New Mexico.....	19,510	31 70	618,467
Arizona.....	19,140	32 50	622,050
Utah.....	57,209	32 75	1,873,595
Idaho.....	33,075	31 90	1,055,092
Nevada.....	18,250	34 10	622,325
Washington.....	122,414	35 40	4,333,456
Oregon.....	115,415	31 05	3,583,636
California.....	308,872	33 75	10,424,430
Oklahoma.....	40,715	31 90	1,298,808
	\$16,292,360		\$514,812,106

Wholesale prices in leading cities of the United States, 1895-1899. Butter per pound.

DATE.	NEW YORK		CINCINNATI		CHICAGO.		ST. LOUIS.	
	Creamery extra. Low. High. cts. cts.		Creamery. Low. High. cts. cts.		Creamery firsts. Low. High. cts. cts.		Creamery extra. Low. High. cts. cts.	
1895.								
January	23	26½	18	21	21	25	23½	27
February.....	23½	26	18	20	20	23½	23	25
March.....	19	23	15	17	16	22½	19	24
April.....	19	21½	15	20	17	20½	22	22
May.....	17	19	14	17	14½	18	18	20
June.....	17½	20	13	17	15	17½	19½	20
July.....	17	18½	15	16	15	17½	19	20
August.....	18	20½	15	18	16	20	20	22
September.....	20	22	15	18	18	20½	22	24
October.....	22	23	16	20	18	22	24	24
November.....	22	24	16	21	18	22½	24	25
December.....	24	28	16	24	21	26½	25	28
1896								
January	20	25	15	18	17	24	21	24
February.....	18	22	15	16	16	22½	19	22
March.....	21	22	15	17	19	21½	22	22½
April.....	14	21	12	15	13	21	15	21
May.....	15	16	12	13	13	15½	16	17
June.....	15½	15½	12	13	13	15	15	16
July.....	15	15½	12	14	12	14½	15	16
August.....	15	16½	12	15	12	16½	15	18
September.....	15	16½	12	15	12	16	15	18½
October.....	16	20	13	16	13	19	16½	21
November.....	20	23	15	20	16	22	19	23
December.....	21	24	16	20	18	23	21	24
1897.								
January	20	22	15	16	17	21	20	21
February.....	19	21½	15	17	16	20½	18½	22
March.....	19	20	15	20	16	19	18½	19
April.....	17	22	13	20	14	21	16½	22
May.....	14	17	12	14	12½	16	13½	16½
June.....	15	15	12	13	13	15	14	15
July.....	15	15	12	13	12	14½	14½	15
August.....	15	18½	12	18	12	18½	14½	19
September.....	18	21	15	18	15½	20½	17½	23
October.....	21	23	16	22	19	23	23	24
November.....	23	23½	14	18	19	23	22	24
December.....	22	24	18	20	18	23	21½	23½
1898.								
January	20	22	16	20	16	21	20	21
February.....	20	20½	16	18	16	19½	19	19½

Wholesale prices in leading cities of the United States, 1895-2899. Butter per pound, continued.

DATE.	NEW YORK.		CINCINNATI		CHICAGO;		ST. LOUIS.	
	Creamery extra. Low. High. cts. cts.		Creamery; Low. High. cts. cts.		Creamery firsts. Low. High. cts. cts.		Creamery extra. Low. High. cts. cts.	
1898.								
March.....	19	20½	16	18	16	20	18½	20
April.....	17	22	14	18	15	21	17	21
May.....	15	17	14	16	14	16½	15	16
June.....	16	17	13	15	14½	16	15½	16
July.....	16½	18½	14	15	14½	17½	16	18
August.....	18½	19	16	17	16	18½	18½	19
September.....	18½	31	16	18	15½	20	18½	21
October.....	20½	23	16	18	17	22	21	23
November.....	23	23½	18	19	19	22	22	23
December.....	20	23½	17	18	16	22	20	23
1899.								
January.....	19	21	16	18	14	20½	19	21
February.....	19	25	17	20	14	21½	19	23½
March.....	20	22	19	20	17	21	20½	22
April.....	17	21½	18	19	14	21	17	21½
May.....	16½	19	16	17	14	18½	17	17½
June.....	18	18½	17	18	16	18	18	19
July.....	17½	18½	16½	18	15½	18	18	18
August.....	17½	21	16½	20	15½	20	18	21
September.....	20½	23	18	20	17½	22½	20	23½
October.....	23½	24	18	20	18	23	23½	24½
November.....	24	27	18	24	19	26	24½	26½
December.....	23½	28	21	24	21	27	26	27

Exports of Dairy Products of the United States during the five years ending June 30, 1899.

	Pounds	Value
1895 Butter	5,598,812	\$915,533
Cheese	60,448,421	5,497,539
Milk		719,235

Total\$6,632,857

	Pounds	Value
1896 Butter	19,373,913	\$2,937,203
Cheese	33,777,291	3,091,914
Milk		270,453

\$6,299,570

1897	Pounds	Value
Butter	31,345,221	\$4,493,364
Cheese	50,944,617	4,636,063
Milk		524,968
Total		\$9 654,396

1898	Pounds	Value
Butter	25,690,025	\$3,864,765
Cheese	53,167,280	4,559,324
Milk		671,670
Total		\$9,095,759

1899	Pounds	Value
Butter	20,247,997	\$3,263,951
Cheese	38,198,753	3,316,049
Milk		1,049,211
Total		\$7,629,211

AN ACT CONCERNING THE SELLING OF TUB BUTTER.

In 1897 when this law was passed, there were many dealers in the State doing quite a large business in taking cheap Western tub butter, pressing it into prints, and putting it upon the market with an attractive wrapper upon which was printed some fictitious name. The public were often deceived by this, supposing in many instances that the butter came from some creamery or dairy in the State. The law has been fairly satisfactory, much less butter is printed from the tub at the present time, and the dealers are all complying with the law. There is a good deal of butter sold in this State that has been printed from the tub, but most of this is done outside the State, and while some of this butter does not bear the stamp of "Tub Butter" in accordance with the law it is very hard to trace connection as we have no authority outside the State and it is very hard to get proof that will stand in court. Examinations have been made in all parts of the state to see that dealers are complying with the law. The following is the text of the law :

SECTION 1. No person by himself, or by his agents or his servants, shall sell, offer for sale, or have in his possession with intent to sell, any butter known as "Tub Butter" which is pressed or printed into what is

known as bricks, pats or balls, except under the following conditions: Every such brick, pat, or ball shall have the words "Tub Butter" in one-half inch Roman letters, stamped or pressed upon it, and if wrapped, the wrapper shall be marked in like manner. It shall be the duty of the Dairy Commissioner to attend to the enforcement of this Act throughout the State; and for this purpose the Commissioner and his deputy shall have free access at all reasonable hours to all places and premises where the Dairy Commissioner or his deputy suspects that any act in violation of this law has been or is being committed.

SEC. 2. Any person violating any provision of this act shall be fined not more than one hundred dollars.

Approved May 5, 1897.

MILK.

The production and distribution of milk is at the present time one of the most important branches of dairying in the state. Nearly all of the dairymen adjacent to our large towns and cities are producing milk for the retail trade. More thought and care is expended on this branch of dairying than ever before. Better cows are kept and more attention is paid to cleanliness and better hygienic conditions obtained in nearly all of the dairies. The markets in the large cities of Boston, Providence and New York, to which large quantities of milk are shipped, calls for a higher standard and more care as to purity and freedom from adulteration. We have in some of the cities of the state milk inspectors who are doing good work in Hartford; Inspector Roberts is especially careful and thorough in his work and we are glad to state that most of the milk that is sold under his jurisdiction is of high standard.

The special milk law as it has stood upon the statute books for some years is given below. This law is quite general and applies to all, but as no one has any special authority in regard to it, it does not have the strength that it otherwise might. There was also passed at the last session of the legislature the law giving the right to cities and boroughs to appoint inspectors with power to inspect animals and buildings, in which animals are kept. This law was also given: The general pure food law which includes milk is the one under which general work outside of regular city inspection as regards quality and purity can be carried on. This law is given later on under the topic of pure food. As there has been quite a feeling manifested in regard to the milk question of

late we prepared and sent out to leading dairymen in the state the following questions with requests for answers. The answers given below to these questions are some of those that were received :

HARTFORD, CONN., 1900.

DEAR SIR:—The Dairy Commissioner will soon issue the report for 1900. Will you please answer the following questions to be printed over your signature?

1. Do you think that the existing laws are sufficient in regard to impure and adulterated milk?
2. Does the skimmed milk upon the market injure the dairy interests in the price and sale of milk?
3. Will you please to state any change or addition which you would favor to the existing laws in regard to the production and sale of milk?

Yours respectfully,

JONH B. NOBLE,

Dairy Commissioner.

The following among other replies were received :

1. At the present time there is very little adulterated milk sold. The greatest adulteration is filth.
2. Yes.
3. I think that skim milk should not be sold from the same vehicle as new milk.

S. D. NEWELL, Bristol, Conn.

Relative to the Milk laws of the State I would say that in this part of the state or in my locality, the laws are sufficient to protect the farmers and also the creameries. The skim milk upon the market does not, in my opinion, generally hurt the dairy interest.

I. W. STARK, Lebanon, Ct.

1. Sufficient if enforced.
2. Think not.

C. H. SAGE, East Canaan, Ct.

1. If the law is so drawn that its intent can be enforced, I will say yes.
2. What if it does, both are legitimate, honest products, and skim milk will not be adulterated. Would as soon think of curtailing the sale of mutton because it might hurt the sale of beef.

3. I believe in the most stringent laws possible of enforcement against adulteration of all kinds.

L. J. PLATTS, Deep River, Ct.

1. I do.
2. I think it may to a certain extent.
3. I think the laws are sufficient for the present.

W. H. HARVEY, Windsor, Ct.

1. I think that the laws regarding the sale of impure and adulterated milk are sufficient. Some towns might through their board of health secure a stricter enforcement.

2. The sale of skim milk, as skim milk, is a legitimate branch of the dairy business and restriction should only refer to the honesty of its handling.

3. As in the case of some other laws, change is not needed so much as more careful and discriminating enforcement.

E. C. BIRGE, Southport, Ct.

1. No law can be too strict in regard to selling impure milk. Buyers of milk can be so easily imposed upon that they should be protected by stringent laws stringently enforced.

2. I can see no harm to the dairy interests from the sale of skim milk. Of course the seller of skim milk competes in the market with the whole milk man to a certain extent but not as much as if he sold the milk whole. He markets his product as butter and the by-product as skim milk, and if he gets as much as the whole milk would bring he is even. No one would be likely to buy skim milk by mistake for whole milk, and if skim milk is wanted there is no more reason for hindering its sale than there would be for prohibiting the sale of pumpkins because some one wanted to sell pie apples. In brief, the sale of doctored, impure, and adulterated milk should be prohibited. Skim milk and the milk from cows that give milk no better than skim milk should be sold at actual value. If a man is keeping cows that give milk up to five or six per cent. butter fat, he must make butter of it or get a special line of customers willing to pay for quality.

3. It might be a good idea for milk inspectors to be compelled by law to publish a monthly statement in a daily paper giving name of producer or seller and the quality of milk inspected. It might be a little hard on the cheap milkmen, but I have known a cow that forty quarts of new milk would hardly make a pound of butter, while there are cows that ten quarts from will make that amount. The two kinds of milk might go to the customer equally pure, but the value would be quite different and consumers that pay for inspection ought to get the benefit of it.

R. S. HINMAN, Stevenson, Ct.

1. Yes.
2. No.
3. I do not think of any.

J. B. PALMER, Jewett City, Ct.

1. I think that the existing laws are sufficient in regard to impure and adulterated milk.

2 The skim milk upon the market does injure the dairy interests of one class of producers, those making milk for the market, while those selling the whole milk to the creameries get a better price if the skim milk is sold.

3. From my point of observation of the milk producers side of the question, I should favor any change or addition to the existing laws that would be fair to all concerned, producer and consumer alike.

CHARLES S. SPAULDING, Milldale, Ct.

1. The enforcement of existing laws should give a pure article of milk to consumers.

2. I consider the sale of skim milk under present stringent laws a legitimate part of the dairy interests of the State and a boon to sellers and consumers who want it.

CLIFTON PECK, Yantic, Ct

We should have a legal definition of "milk" owing to the great diversity of opinion concerning sanitary stables and methods of milk production. It appears advisable that at least some measures should be taken to provide for a complete and detailed survey of existing conditions.

In the absense of a legal definition of "milk," the sale of skim milk doubtless effects the sale of milk—as no method of control exists—otherwise I believe its sale should be allowed.

F. H. STADTMUELLER, Manager, Elmwood, Ct.

1. I do not.

2. I do not think so.

3. Would recommend that country town should have some rule of inspection of milk sold on the streets to customers.

RICHARD C. WILCOX & SONS, Guilford, Ct.

With proper safeguards against fraud, skim milk should be sold as a cheap and valuable article of food, both in the interest of the producer and consumer,

T. S. GOLD, West Cornwall, Ct.

1. No.

2. To a certain extent yes, but skim milk has rights that must be respected.

3. Standard for quality should be established by legislative enactment.

FARMINGTON.

The present law in regard to milk is as follows:

LAWS TO PREVENT THE ADULTERATION OF MILK.

SECTION 2658 Whoever shall knowingly sell, supply, or bring to be manufactured to any butter or cheese manufactory in this State any milk diluted with water, or adulterated by the addition of any foreign substance, or from which any cream or milk commonly known as strippings, has been taken; or whoever shall knowingly bring or supply milk to any butter or cheese manufactory that is tainted or partly sour, shall forfeit not less than twenty-five, nor more than one hundred dollars, with costs of suit, for the benefit of the person or persons upon whom such fraud shall be committed.

SEC. 2659. The usual test for quality and the certificate of analysis of the director of the Connecticut Agricultural Station, shall be deemed *prima facie* proof of adulteration.

SEC. 2660. No person shall sell, offer, or expose for sale any milk from which the cream or any part thereof has been removed, without distinctly and durably affixing a label, tag, or mark of metal in a conspicuous place upon the outside, and not more than six inches from the top of every can, vessel, or package containing such milk, and such metal label, tag, or mark shall have the words "Skimmed Milk" stamped, printed, or indented thereon in letters not less than one inch in height, and such milk shall only be sold or retailed out of a can, vessel, or package so marked.

SEC. 2661. No person shall sell, or offer for sale, or shall have in possession with intent to sell, or offer for sale, any impure or adulterated milk.

SEC. 2662. Every person who shall violate any of the provisions of the two preceding sections shall be fined not more than seven dollars, or imprisoned not more than thirty days, or both.

SEC. 2663. A printed notice of this and five preceding sections shall be conspicuously posted in all public places, creameries or factories where milk is received or sold.

SEC. 2664. Any person who shall knowingly sell, or expose for sale, milk or any product of milk, from any cow which shall have been adjudged by the Commissioners upon Diseases of Domestic Animals, affected with tuberculosis, or other blood disease, shall be fined not more than seven dollars, or imprisoned not more than thirty days, or both.

AN ACT FOR THE SUPERVISION OF THE MILK TRAFFIC.

SECTION 1. The Warden and Burgesses of any borough, or the Mayor, with the approval of the Common Council, of any city within this State, may have and are hereby given the right to appoint a competent person as Milk Inspector, who may personally, or by some competent person appointed by him and approved by such Board of Warden and Burgesses, or the Common Council, inspect all milk sold, or offered for sale in such

borough or city; may inspect all animals producing such milk, whether within the limits of such borough, or city, or not; may inspect the buildings, or places where such animals are kept, the dairy and all other places where such milk is kept, handled, sold, or produced, whether the same be within the limits of such borough, or city, or not; and said Board of Warden and Burgesses, or Common Council may prohibit the sale of such milk within the limits of such borough, or city, excepting by such persons as shall first register their names, residences and numbers in a book kept for the purpose at the office of the Clerk of such borough, or city. The Clerk shall receive for each name so registered the sum of fifteen cents from the treasury of such borough, or city

SEC. 2. Such inspector, or assistant shall have the right to take samples of milk from any producer, or vendor, in quantities of not less than one pint, upon tender of the market price therefor, but he shall, if such producer, or vendor so request, suitably seal and mark a duplicate sample of such milk and leave the same with such producer, or vendor.

SEC. 3. The Warden of any Borough, or the Mayor of any city shall have power at any time to remove any inspector appointed under the provisions of this act, for cause.

Approved June 20, 1895.



CREAMERY OFFICE, BUILDING AND BARN FROM DIXWELL AVENUE, NEW HAVEN.



RECEIVING PLATFORM.



SEPERATING, CLARIFYING AND PASTEURIZING FLOOR.

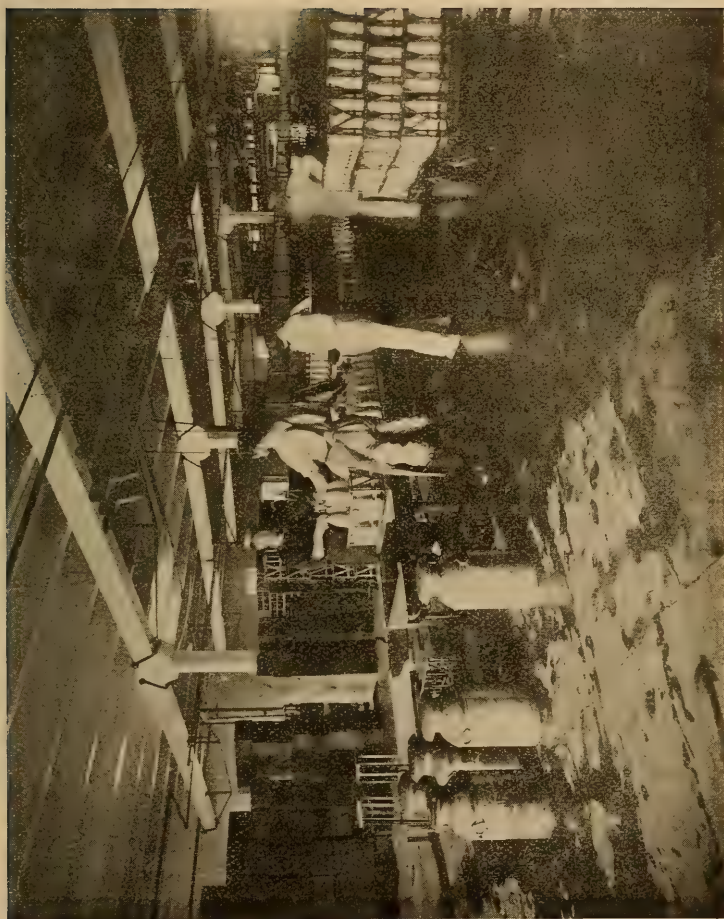
CREAMERY
OF THE
NEW ENGLAND DAIRY COMPANY

AT
NEW HAVEN, CT.

As being one of the largest milk distributing agents in the state, and in its equipment ranking among the very first concerns of its kind in America, the New England Dairy Co. of New Haven, its plant and its methods, are of general interest to all dairymen.

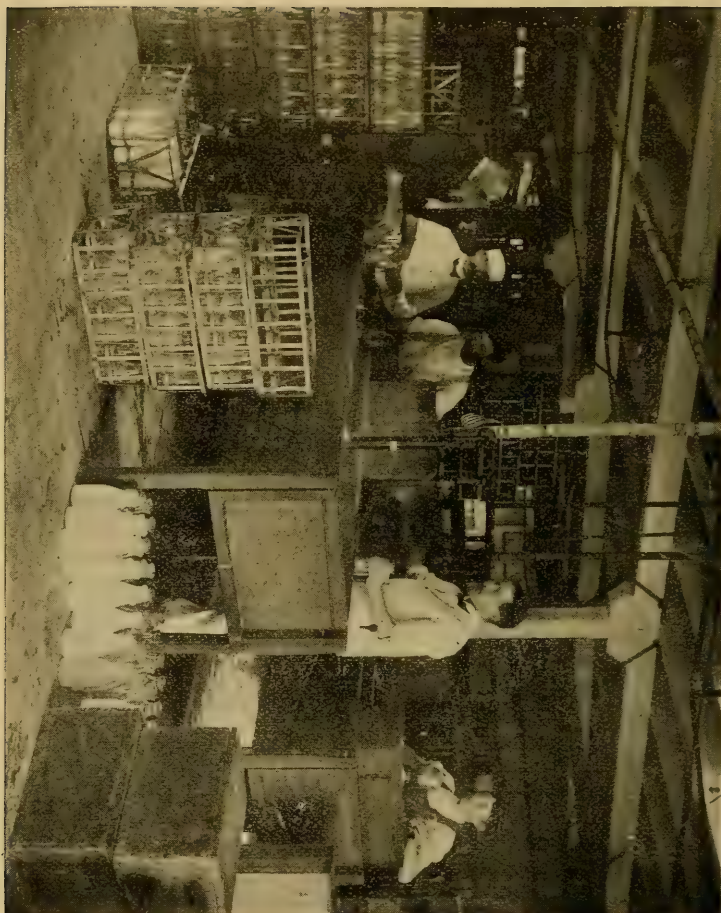
The company was organized in 1899, as a direct result of agitation among leading citizens and prominent physicians, who were dissatisfied with the unsystematic and unsanitary manner in which the business was then carried on in the city. While a few New York promoters may have been the immediate cause of the organization of the New England Dairy Co. as such, the concern unquestionably owes its origin and life to a sentiment which had already taken deep root among more thoughtful citizens, a sentiment that there should be radical reform in the method and means of local milk distribution; for, while perhaps the greater part of the milk sold in the city was cared for and delivered in as sanitary a manner as the conditions allowed, a great deal of the product was handled in a manner endangering the public health, and all of it delivered by a system expensive and wasteful in every particular. That this sentiment in favor of a less expensive and more sanitary milk service has been constantly increasing in strength, is evidenced by the steadily growing trade with which the efforts of the company to furnish an economical and hygienic service have been rewarded.

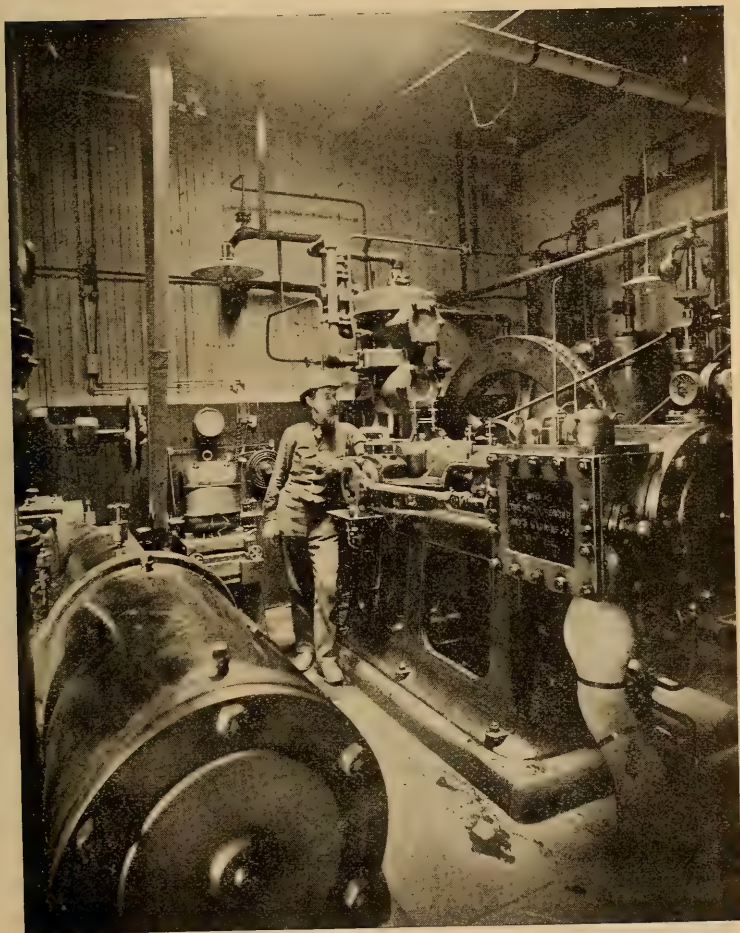
Judging from the first view of the white painted buildings, one expects cleanliness, and finds it everywhere, from the receiving platform where the incoming milk is weighed, to the shipping



BOTTLING ROOM.

BOTTLE WASHING ROOM.





ENGINE ROOM.

platform, whence it is taken for delivery to customers, in the early hours of the morning.

The Creamery is built for handling the milk by the gravity system, thus making possible the use of open and easily cleaned conductors, and obviating the expense as well as the ill effects of pumping the milk from one place to another.

The incoming milk flows through the weigh can into the receiving vats, of which there are two, one for the best milk received, and one for that which is inferior in quality. These receiving vats are double, and are so constructed that a body of ice-cold water surrounds the inner vat containing the milk, which it maintains at a desired temperature.

On the next plain below are the separators, so placed as to receive the milk from the vats by gravity. Here the milk for bottling is clarified, and the surplus made into cream, a portion of which is bottled for family trade, and the balance turned into butter.

This clarified milk flows again through an open and easily cleaned conductor, into the pasteurizer, where souring, as well as disease germs are destroyed, and where what stray odors may remain are driven out. Thence again, through an open conductor, the milk flows to the bottling car, an open, all metal and perfectly sanitary machine, specially designed by one of the leading manufacturers. From this machine the milk flows, without dipping, slopping, pumping, or wasting, filling sixteen quarts, or twenty pints, by a simple and easy operation lasting just four seconds. When the bottles are capped, they are placed in galvanized iron trays and stored away in tanks of ice-water, in a room whose temperature is held at 45, by means of a twenty ton refrigerating machine.

All empty bottles that are returned, are thoroughly washed in hot water, rinsed, and drained for sixteen hours before being refilled. The pasteurized milk is put up in bottles that have been sterilized under pressure in a sterilizing oven at a temperature of 220, and are sealed with parafine, thus making possible, milk that is absolutely free from disease germs.

The Butter Department is equipped with cream vats, box churn, drum worker, and butter printer, again all on the gravity system.



OFFICE BUILDING AND CREAMERY FROM SHELTON AVENUE.

The whole plan of the Creamery is to deliver the products from the producer to the consumer with the least handling, at the smallest possible expense, and with the highest degree of safety to the public health.

The Ice Cream Department of the company is situated in the center of the city, at a point convenient to express offices and freight depots. In addition to the ice cream for which the company is justly famous, a new department has been added: a bake shop to make further "bi-products" in the form of fancy cakes and other delicacies.

The entire establishment is always open to visitors, and those who are interested in dairying are especially welcome.

ADDRESS

OF THE

HONORABLE H. C. ADAMS,

Dairy Commissioner of Wisconsin,

Delivered before the National Association of State Dairy and Food Departments at Chicago.

"A Dairy Commissioner from a Dairy State."

Mr. Adams spoke as follows :

Gentlemen of the Association.—I am complimented by being placed on this programme. I suppose I ought to have returned the compliment by making an elaborate address and giving to it full preparation. I have not done this for several reasons. One reason was, it seemed to me, that the length of the sessions would be so brief we wouldn't have very much time, and I am one of the members who think that the most good can be got out of discussion. For these reasons I shall simply talk for a few minutes.

I feel complimented also by having Wisconsin called a dairy state, because I know and you know that those states where the dairy interests are the largest are the most prosperous. You go into those counties of Wisconsin which are largely dairy counties and you will find the average value of farm lands is almost double that of those counties where they do not follow dairying to any considerable extent. Go into those counties and you find the farms in good condition, with good barns and good houses, and that the mortgages are pretty scarce among those people. As an illustration of that I wish to say that a friend of mine connected with the rural mail service recently established a route in Central Wisconsin which included 195 farms, and of that 195, 194 owned their farms free of incumbrance, and the other man was a tenant with \$3,000 in the bank. So this business of dairying is of practical value to the state. In Wisconsin we went through the same old process as the other Western states. We raised wheat. It was the easiest thing to do; didn't have to work a great while in the year; took the wheat to the market and sold it, and then had a chance to lay around during the winter and have a good time. They kept that up until the farms were cleaned out, and the only thing to do to restore the fertility of the soil and get back the original capital was the business of dairying. It has had rapid development in recent years. In our state we have 160,000

farmers. We have 2,000,000 people. We have about 900,000 cows and make about 73,000,000 pounds of butter and from 55,000 to 60,000 pounds of cheese. We have about 2,800 cheese factories and creameries in Wisconsin.

It has been my good fortune as dairy commissioner to live in a state where the people comprehend fully the character and value of the dairy interests and we have not had the difficulty that has met some of the gentlemen from other states. A good deal of our development in the dairy business has been due to the State Dairymen's Association. I am going to refer to this because I suppose you want to know what it is that has made Wisconsin distinctively a dairy state. It so happened that about twenty-seven years ago State Dairymen's Association was organized. Its members went at it not for the purpose of placing themselves before the public, not with any political axes to grind, but to see what they could do to make the Wisconsin cow a better cow, to make Wisconsin butter better butter, and Wisconsin cheese better cheese. For nearly thirty years the association has been working on those things. In 1860 the average butter production per cow was about sixty pounds. The Wisconsin cow was a pretty poor animal. In 1895 the average production was about 130 pounds. We had improved her tremendously. That association grew to be of such value that it was the subject of universal comment throughout the state. Out of its meetings grew the Wisconsin Farmers' Institute, established in 1887, and they furnished another agency for better education in our state. We hold now about 100 every winter. Practical men—not simply men who talk, but men who know—go to the institutes and instruct the farmers in their business, and do not waste time in talking about politics. They talk about cows up there and milk and what is required to make business men and successful men and better farmers.

This organization has been behind the dairy and food laws of our state, and year after year we passed resolutions asking the legislature to establish a dairy commission. One object of getting that commission was to enforce what dairy laws we had at that time, and another was to have an organization in the state whose business it should be not only to enforce those laws, but to ascertain as far as their judgment and experience would go what laws were required. That commission was established in 1889. It was established through a bill which was drawn up by a committee appointed by the Wisconsin Dairymen's Association to draft a bill upon the subject. At a later period, when we found the need of more stringent laws with reference to filled cheese and other dairy products, another committee was appointed, of which I was a member, and which secured the services of a gentleman whom I believe to be one of the best lawyers in Wisconsin, to draft the oleomargarine, filled cheese, baking powder and general pure food laws of the state.

Of course, there was some opposition in the legislature, but I want to say this with reference to some of the gentlemen who are designated as politicians, that we found the majority of them in Wisconsin friendly to us,

and some of the most efficient help we received in the passage of these measures was through men who are commonly designated as professional politicians. At the same time we had to adopt pretty radical measures with reference to some of them, had to watch them pretty closely to keep them from yielding to certain influences. While I believe that in the management of these men, in being courteous as long as you possibly can, when the time comes when you cannot influence them by reason and good sense, by patriotism and loyalty to state interests, it is a pretty good time to get out a club and use it vigorously.

In Wisconsin the commissioner receives a salary of \$2,500 and expenses and is provided with an assistant at \$1,800 a year, a chemist at \$1,800 a year, a dairy inspector, and we have a stenographer. Of course, you gentlemen who are interested in this work know what a task it is, what a tremendous job it is to enforce your dairy and pure food laws. You simply cannot do everything, but there are some things you can do. Before I reach this point I wish to say with reference to the oleomargarine law that we considered pretty carefully a proposition to enact a law that would absolutely prohibit it. It was our final judgment that a law of that kind would be declared unconstitutional by the United States Supreme Court. We also considered a proposition to require oleomargarine to be colored pink or some other color foreign to its natural color, as was done in New Hampshire and Minnesota, but we deemed that that probably be declared unconstitutional by the United States Supreme Court. We adopted the Massachusetts law for the reason that it seemed to be grounded on good sound reason and because it had been passed upon by the Massachusetts court.

When the anti-color law was first passed in Wisconsin we gave a reasonable time for the retail dealers to get rid of their goods. The time seemed longer to some of my friends than they thought proper and they came to me and said: "Why don't you enforce the oleomargarine law? It ought to be enforced?" I said: "I have the power to enforce it, but it will be difficult to convince a Wisconsin jury if I take radical measures like that." I let several months go by to allow them to become familiar with the law. I then began actions. One or two of the defendants were personal friends of mine and it wasn't a pleasant thing to do. The defense retained an ex-attorney general of the state and we had a bitter fight. This was in Madison. We won the cases. We then went to Milwaukee to test the efficiency of the labeling law, which previously to that time had been the only restraint. We made three arrests of men who had not properly labeled their parcels of butterine and made thirteen arrests of men who had sold butterine colored in violation of the law. We lost every one of the cases tried under the branding law. When we came into court we gave the testimony of the officers of the department who bought the oleomargarine with the parcels not labeled. We gave the testimony of the men who bought the oleomargarine that there were no signs exposed in the place of business as required by law. In rebuttal of this the defendants swore that on a box

back of the counter they had a placard, "Oleomargarine sold here." Our attorney said to the court that the law required every package, tub or parce to be labeled "Oleomargarine." The judge decided that the tub behind the counter was a parcel, and we lost every one of the cases. We went into the same court with the judge prejudiced against us under the anti-color law, against attorneys who were able and vigorous, and secured a conviction by a jury in a few minutes after they went out, after a four days' fight. We produced such an effect upon the defendants that one came around and said he thought we were right and he was wrong. That shows the difference between our success in enforcing the anti-coloring law and our success in enforcing the law which simply relates to labels. They are extremely difficult of enforcement. In 1897 we passed a general pure food law and have been doing some work under that law. It would have been very easy under that law, which affected every groceryman in the state, to have started wholesale prosecutions. That did not seem to me the proper thing to do. The law provided that it should not go into effect until a year after its passage. I put myself in communication with the Wholesale Grocers' Association of Milwaukee and had a meeting of those gentlemen at the Hotel Pfister in Milwaukee. They expressed themselves as being in sympathy with the law. They said they believed in it and then they proceeded to argue with reference to nearly everything that was affected by the law and claimed we ought to make an exception in favor of them. The outcome of that meeting was that they agreed to stand by the law and a circular was issued to the trade containing information in reference to it. The circulars were scattered through the state and they were carried everywhere by traveling men. Six months after that law went into effect we had very few prosecutions.

I want to say to the dairy commissioners that we must never forget that the prime purpose of dairy and food commissioners is to secure the sale of the greatest amount of pure food products and the smallest amount of imitation products, not necessarily by prosecution, but by education. The part of the dairy commission is to educate. That is the easiest way and the pleasantest way, and it is the vital duty of these commissions to do everything that can be done to inform people as to the character of the laws and the reasons that lie under them.

If Prof. Mitchell was not here I would like to say something about our chemist. We will consider him absent. When the governor was kind enough to appoint me commissioner I realized the necessity of having a chemist who understood his business and who was honest and industrious. Several applicants were friends of mine in the university where I was a student for many years. They came to me with good political influence and good character and wanted employment. I learned that Mr. Mitchell was a better chemist than any of these and I said I would like to appoint Mitchell of Milwaukee. The governor said: "These other fellows have pretty strong backing. Ain't they all right?" I said: "I guess so, but don't

think they are as good as Mitchell." He said: "Is he a Republican?" I said: "I didn't think of that, but I will find out." I ascertained that he was and he was appointed. I would have been absolutely helpless in the enforcement of the law if I hadn't somebody to go on the stand and testify that had a thorough knowledge of his business. The entire work of the dairy commission rests upon the work of the chemist. If the other side puts a man on the stand who knows more about the business than the chemist I put on, I am simply gone. I have been fortunate in another way. I have an assistant who never stops to argue, but one who will attend to the business when requested. If you are not competent to tell your assistant what to do you ought to be removed from office instantly.

So we get along pretty well in Wisconsin. We have been successful in every prosecution, I think, under the pure food law in the line of preservatives except one. I wasn't present at the time, but in one case a farmer who had put a preservative in his milk swore upon the stand that he put it in with the intention of giving the milk to calves. I have known several cases where calves have been given milk that contained preservatives and it very seriously affected their health. (Laughter.)

This is serious, and not a joke. The subject of preservatives has caused a good deal of contention in Wisconsin. A gentleman who was a stranger to me a short time ago said to me: "You saved the life of my child." I said: "I didn't know I was in the life-saving business, but if I have done it inadvertently I would like to know it." He said: "I have a baby six months old, brought up on a bottle. He had been sick for weeks, and you arrested the milk man, and the child got well." Take the newspapers of the state and the business men whom you meet everywhere. They are very sensitive over this matter and they are back of the commission in its efforts to keep everything out of the milk that ought not to be there.

My friend from Pennsylvania has made interesting statements in his paper in regard to the character of the milk supply of Philadelphia. When I first took the office of dairy commissioner we went down to Milwaukee and took samples from 200 milkmen and tested them. The tests indicated that if the entire milk supply of Milwaukee was of the character of that sold from the wagons it was adulterated with about 16 per cent of water. Upon that basis the people of Milwaukee were being defrauded out of a quarter of a million dollars annually by the sale of adulterated milk. We have very little trouble in Wisconsin in securing convictions in milk cases. The law makes the standard 3 per cent. If I recollect correctly the standard in Massachusetts is $3\frac{1}{2}$ per cent. The question has been raised a number of times in our state and other states as to whether the state could fix a legal standard and convict a man for selling adulterated milk when the cow gives milk which is below the legal standard. That has been determined by the courts, and the decision is that the state, in the exercise of police power has the right to fix the standard, and that it is against public policy to have milk sold which is not up to the standard, whether the cow adulterates it or

the man does. Of course, we haven't done everything we would like to do. We haven't raised the question of liquors at all. It is within the province of the commission to take up the subject, but with the force at our disposal, we haven't gone into it. I went to the legislature and endeavored to have additional inspectors appointed. I secured one. I should have had two. These inspectors visit the dairies in the vicinity and within the city limits of the larger cities and ascertain their condition. There is an immense amount of unwholesome milk sold in cities, because the stables are filthy and the dairymen are dirty. That is something which affects the health of the people and ought to be avoided. We had the inspector of the dairies in the vicinity of Milwaukee notify these men that they must clean up. Some of them failed to clean up and we had some prosecutions which were successful. On the second round the inspector found a marked improvement. The third time of visiting the dairies in the vicinity of Milwaukee he found a tremendous change. It seems to me it is very valuable work on the part of the dairy commission to keep the sources of the milk supply safe and correct this fault. There is another thing which it seems to me ought to be done, but which is not done in any state that I know of, and that is this: There should be a law upon the statute books of every state which should authorize the dairy commissioner and give him the authority and power to enforce the law, and money enough to enforce it, to go into every factory and creamery and compel them to be clean. If we could do that in Wisconsin we could make Canada dizzy. If in Wisconsin and Minnesota and Iowa and everywhere the state would only go in and compel them to clean up their factories we would have a change that would be astonishing.

There are many other things we might do, but I want to say this: We are fairly well satisfied in Wisconsin and are backed up by public sentiment, but we have some difficulty with juries. We had an oleomargarine case where the defendant's lawyer admitted the facts and admitted the law and put in no testimony in rebuttal, but went before the jury and said: "Gentlemen, this man is a good fellow. He has lived here a great many years and he has lots of friends, and he is kind to his children and we all like him. I hope you will acquit him." And the jury acquitted him in less than three minutes.

There is one other point I want to bring up. That is with reference to butter colors. The gentleman from New York says: "What ought we to do in reference to the sale of butter colors?" That is rather a perplexing question. There are different kinds on the market. One of these butter colors is poisonous. We know there are very large commercial interests connected with this butter color business. A whole lot of gentlemen, very friendly to the butter interest, and whose kindness we appreciate in many ways, are manufacturing these colors and placing them on the market. It is questionable whether the laws of New York, Massachusetts, Wisconsin, permit the sale of butter coloring which is made of aniline dyes, of which, if you take a certain quantity, it will make you sick; in other words, which

is injurious to the health and poisonous. If we consider butter color as food, just as we consider baking powder as food or cream of tartar as food, we can stop the sale of that which is poisonous. But that is a question for consideration. If I could get any light upon that subject I would like it. One thing more I want to say, and that is about baking powder. Mr. Mitchell and myself drew the law in Wisconsin with reference to baking powder. It requires that alum baking powder should be labeled that it contained alum. Some of the manufacturers of baking powder said the cream of tartar people caused that to be passed. That was not true. Representatives of the baking powder interest came up to see me, and one of them brought a package of authorities to prove the healthfulness of alum baking powder. I said: "I do not want to read them. I did not consider that when I drew the law. Our object is to protect the people against fraud. We don't care anything about the healthfulness, but we do not want baking powder sold as cream of tartar which is not." It is a question of fraud and nothing else. We passed a law also that provided if a patent medicine contained anything poisonous or injurious to the health it should be labeled, "This bottle or package contains poison." In two or three weeks the managing editors of five of the leading papers of Milwaukee came to see me.

MR. MITCHELL: Not the word poison, but the name of the ingredient.

MR. ADAMS: That may be. I asked them what interest they had in the matter and they said those medicines were advertised in their papers and it would interfere with their business, and they wanted me to drop it. I told them I would make a compromise, we would only require a label where in the opinion of the State Board of Health the medicine contained something injurious to the health.

The dairy interests of Wisconsin are fairly well protected. We had 137 licenses for the sale of oleomargarine four or five years ago; we have seven or eight now. There is one thing I don't know how to stop and if anybody can advise me I should like to be informed. The oleomargarine manufacturers and wholesale dealers and shippers in Chicago sell oleomargarine direct to consumers in Wisconsin to quite a considerable extent. Oleomargarine will be sent direct to boarding houses and cheap restaurants, and I am unable to devise any way in which I can reach and prevent this practice which is in violation certainly of the spirit of the Wisconsin law.

PROCESS BUTTER.

The sale of process or renovated butter is, as stated in my last report, quite a business in the state. There is none of it manufactured in Connecticut, but it is shipped here from factories of the West and Middle States. A full description of this butter was given last year. This butter is produced from taking original packing stock and other butter and melting the same so that the

butter oil can be drawn off, mixed with milk or other material and churned, and thus produce butter. While there may be nothing injurious to health in this butter it certainly ought to be sold under its own name and not come into competition with creamery or dairy butter. With this as with other goods, they should be sold for what they are so that people may know just what they are purchasing and using.

Laws have been passed in several States regulating the sale of this butter and making it obligatory for any person, firm, or corporation who sells or offers for sale, or have in their possession with intent to sell any process butter, to brand it with the name "Process Butter."

Michigan has a very strong law and makes it a misdemeanor to sell any of this butter not marked punishable by a fine of not more than one hundred dollars.

VINEGAR.

The vinegar law as passed in 1889 and amended in 1897 has proved itself to be of a great deal of importance to all producers and consumers of pure vinegar in the State. We give the standards established by several of the different States for vinegar which is manufactured or sold within the State. No State has a lower standard for acidity than Connecticut and very few any lower in solids. Our own law which places the standard for acidity at four per cent. and for cider vinegar solids at two per cent. is fortunately one which can be complied with without hardship to any one who desires to put a reliable article on the market.

The vinegar industry in the State is one of importance and all producers of pure vinegar should have ample protection in their business. The cheap acid vinegars can be so readily and so cheaply manufactured with acetic acid, wood acid, and water, with coloring matter added that unless constant watch is kept throughout the State the quantity sold would be quite large and it would displace a like quantity of pure vinegar. Much of this impure vinegar would undoubtedly be manufactured illegitimately in the State.

Nearly every State has recognized the importance of a vinegar law, and some of them have a much stronger law than our own. We give extracts from laws of Ohio and New York, which show what some of the larger States are doing.

Thorough examination has been made in all parts of the State to see that the law is complied with. A large number of samples have been taken, and when necessary that a complete analysis should be made samples have been sent to the Experiment Station.

A list of samples analyzed, with analysis, is given. A large proportion of these is cider vinegar, and most of them up to the standard.

We are glad to notice an improvement over our last report, in which we noted a number of prosecutions for selling fraudulent vinegar as pure cider vinegar.

All reputable dealers in the State are desirous of selling pure straight goods and welcome a careful examination. We can say with confidence that the operation under this law has been beneficial to both producer and consumer. Vinegar has been brought to a higher standard and the quality improved.

Many of the smaller dealers are occasionally negligent and fail to comply with the law in regard to branding. This is quite important, and dealers should in all cases see that the casks are so marked or branded as to give the amount of vinegar, maker's name and place of manufacture.

We believe that nearly all of the cheap, fraudulent brands of vinegar have been driven from the State.

The following is the law as it now stands:

LAW IN RELATION TO THE MANUFACTURE AND SALE OF VINEGAR.

SECTION 1. No person shall make and sell, or make for sale, as cider vinegar, any vinegar not produced wholly from the juice of apples. No person shall add to any vinegar or to any article sold or to be sold as vinegar, any drug, any hurtful or foreign substance, any coloring matter, or any acid. Any person violating this section of this act shall be fined fifty dollars for a first offense, and for a second or later offense he shall be fined one hundred dollars and imprisoned thirty days.

SEC. 2. No person shall make and sell, or make for sale, any vinegar not having an acetic acidity equivalent to the presence therein and not less than four per centum by weight, of absolute acetic acid, and in case of cider vinegar, not less than two per centum by weight of cider vinegar solids upon full evaporation over boiling water. No maker of vinegar shall sell the same without conspicuously branding, stenciling, or painting upon the head of the barrel, cask, keg, or package containing the same, the name of the maker, his residence or place of manufacture, and the true name of the kind of vinegar contained therein as "cider vinegar," "wine vinegar," "malt vinegar," or "wood acid vinegar;" provided, that this clause concerning marking shall not apply to retail sales, at the place of manufacture, in quantities less than five gallons, and in open packages. Any person violating this section of this act shall be fined ten dollars for the first offense, and for a second or later offense fifty dollars.

SEC. 3. No person shall sell, or offer, or expose for sale or exchange, or solicit, or receive any order for the sale or delivery within this State, or for delivery without this State for shipment into this State: first, any vinegar, as cider vinegar, not wholly produced from the juice of apples; or second, any vinegar, or article sold, or to be sold as vinegar, in which has been added any drug, or any hurtful or foreign substance, or any coloring matter, or any acid; or third, any vinegar not having an acetic acidity

equivalent to the presence therein of not less than four per centum by weight of absolute acetic acid, and in case of cider vinegar, not less than two per centum by weight of cider vinegar solids upon full evaporation over boiling water; or fourth, any vinegar in a barrel, cask, keg, or other package not branded, stenciled, or painted as required by a previous section of this act. Any person violating this section of this act shall be fined ten dollars for a first offense, and for a second or later offense fifty dollars. The delivery of any of the above mentioned articles upon any order solicited or received within this State shall be conclusive evidence that the order upon which such delivery was made was for such articles, and shall render the person soliciting or receiving such order liable to the penalty above prescribed.

SEC. 4. It shall be the duty of the Dairy Commissioner to attend to the enforcement of this act, and for the purpose of examining into suspected violations thereof, he shall at all reasonable hours have free access to all places and premises where he suspects that any provision of this act is violated, and on tender of the market price of good vinegar therefor, he may take from any person, firm, or corporation, samples of vinegar which he suspects of being made or sold in violation of this act; and he may himself analyze such samples, or have such samples analyzed by any State chemist, or by the Experiment Station; and a sworn or affirmed certificate by such analyst shall be *prima facie* evidence of the ingredients and constituents of the sample analyzed; and if such analysis shall show that such sample does not conform to any requirement of this act, and shall give the Dairy Commissioner reasonable ground for the belief that any provision of this act has been violated, he shall make complaint to the proper prosecuting officer, to the end that the violator may be prosecuted.

SEC. 5. Any person refusing the Dairy Commissioner, or his deputy, access, in a reasonable manner and at a reasonable time, for said purpose of examination, or refusing to sell samples, as hereinbefore provided, shall be fined not more than seven dollars or imprisoned not more than thirty days, or both. Evidence of any violation of this act shall be *prima facie* evidence of willful violation with knowledge.

Approved, March 29, June 21, 1889.

VINEGAR LAW OF THE STATE OF OHIO.

AN ACT

To prevent the adulteration of vinegar.

[Passed March 30, 1896, took effect June 1, 1896; 92 O. L., 100.]

SECTION 1. *Be it enacted by the General Assembly of the State of Ohio*, That no person shall manufacture for sale, offer or expose for sale,

sell or deliver, or have in his possession with intent to sell or deliver, any vinegar not in compliance with the provisions of this act. No vinegar shall be sold as apple, orchard or cider vinegar which is not the legitimate product of pure apple juice, known as apple cider; or vinegar not made exclusively of said apple cider; or vinegar into which foreign substance, drugs or acids have been introduced, as may appear upon proper test, and upon said test shall contain not less than two per cent., by weight, of cider vinegar solids upon full evaporation at the temperature of boiling water.

SECTION 2. All vinegar made by fermentation and oxidation without the intervention of distillation shall be branded "fermented vinegar," with the name of the fruit or substance from which the same is made. And all vinegar made wholly or in part from distilled liquor shall be branded "distilled vinegar," and all such distilled vinegar shall be free from coloring matter added during or after distillation and from color other than that imparted to it by distillation. And all fermented vinegar not distilled shall contain not less than two per cent., by weight, upon full evaporation (at the temperature of boiling water) of solids, contained in the fruit or grain from which said vinegar is fermented, and said vinegar shall contain not less than two-and-a-half tenths of one per cent. ash or mineral matter, the same being the product of the material from which said vinegar is manufactured. And all vinegar shall be made wholly from the fruit or grain from which it purports to be or is represented to be made, and shall contain no foreign substance, and shall contain not less than four per cent., by weight, of absolute acetic acid.

SECTION 3. No person shall manufacture for sale, offer for sale, or have in his possession with intent to sell, any vinegar found upon proper test to contain any preparation of lead, copper, sulphuric or other mineral acid, or other ingredients injurious to health. And all packages containing vinegar shall be branded on the head of the cask, barrel or keg containing such vinegar, or if sold in other packages that each package be plainly marked with the name and residence of the manufacturer, together with brand required in section two hereof

SECTION 4. Whoever violates any of the provisions of this act shall, upon conviction, be fined not less than fifty dollars, nor more than one hundred dollars, or imprisoned not less than thirty days, nor more than one hundred days, or both; and shall be adjudged to pay in addition all necessary costs and expenses incurred in inspection and analyzing such vinegar.

SECTION 5. That the act passed April 14, 1888, be and the same is hereby repealed, and this act shall take effect and be in force from and after June 1, 1896.

DAVID L. SLEEPER,

Speaker of the House of Representatives.

ASAHEL W. JONES,

President of the Senate.

VINEGAR LAW IN THE STATE OF NEW YORK.

ADULTERATED VINEGAR.

Section 50. Definition of adulterated vinegar.

51. Manufacture and sale of adulterated or imitation vinegar prohibited.
52. Packages containing cider vinegar to be branded.
53. Penalties.

§ 50. Definition of adulterated vinegar. All vinegar which contains any proportion of lead, copper, sulphuric acid, or other ingredients injurious to health, or any artificial coloring matter or which has not an acidity equivalent to the presence of at least four and one-half per centum, by weight, of absolute acetic acid, or cider vinegar which has less than such an amount of acidity, less than two per centum of cider vinegar solids on full evaporation over boiling water, shall be deemed adulterated. The term, cider vinegar, when used in this article, means vinegar made exclusively from pure apple juice.

§ 51. Manufacture and sale of adulterated or imitation vinegar prohibited. No person shall manufacture for sale, keep for sale or offer for sale :

1. Any adulterated vinegar.
2. Any vinegar or product in imitation or semblance of cider vinegar, which is not cider vinegar.
3. As for cider vinegar, or vinegar or product which is not cider vinegar.

§ 52. Packages containing cider vinegar to be branded. Every manufacturer or producer of cider vinegar shall plainly brand on the head of each cask, barrel, keg or other package containing such vinegar, his name and place of business and the words "cider vinegar." And no person shall mark or brand as or for cider vinegar any package containing that which is not cider vinegar.

§ 53. Every person violating the provisions of this article shall forfeit and pay to the people of the state the sum of one hundred dollars for each violation.

The following is a list of some of the samples taken in the year and the result of the analysis by the Agricultural Experiment Station :

No.	Kind.	Solids per cent.	Acidity per cent.
1	Cider Vinegar,	2.24	4.21
2	Cider Vinegar,	1.65	3.64
3	Cider Vinegar,	3.20	4.39
4	Cider Vinegar,	....	4.85
5	Cider Vinegar,	3.09	4.66
6	Cider Vinegar	2.60	3.94
7	Cider Vinegar,	1.84	5.28
8	Cider Vinegar,	3.33	3.84
9	Cider Vinegar,	2.82	4.00
10	Cider Vinegar,	2.17	5.05
11	Cider Vinegar,	2.34	4.13
12	Cider Vinegar,	1.89	4.11
13	Cider Vinegar,	1.91	4.04
14	Cider Vinegar,	2.70	4.56
15	Cider Vinegar,	1.74	4.07
16	Cider Vinegar,	1.85	4.32
17	Cider Vinegar,	....	4.95
18	Cider Vinegar,	1.84	3.84
19	Cider Vinegar,	2.02	4.24
20	Cider Vinegar,	2.82	4.44
21	Cider Vinegar,	1.65	2.28
22	.....	....	3.73
23	Cider Vinegar,	.25	4.83
24	.....	....	5.21
25	Cider Vinegar,	2.49	3.86
26	Cider Vinegar,	1.79	3.03
27	Cider Vinegar,	2.43	4.99
28	Cider Vinegar,	2.34	4.14
29	Cider Vinegar,	3.03	4.27
30	Cider Vinegar,	2.99	4.64
31	Cider Vinegar,	2.27	2.98
32	Cider Vinegar,	1.72	3.84
33	Cider Vinegar,	2.99	3.94
34	Cider Vinegar,	2.40	4.95
35	Cider Vinegar,	2.04	3.92
36	Cider Vinegar,	2.59	4.87
37	Cider Vinegar,	1.94	4.32
38	Cider Vinegar,	3.09	3.99
39	Cider Vinegar,	2.63	4.87
40	Cider Vinegar,	3.02	4.99
41	Cider Vinegar,	3.12	4.87
42	Spiced Vinegar,	0.34	4.71
43	Cider Vinegar,	2.74	3.97
44	White Wine Vinegar,	0.34	4.82

No.	Kind.	Solids per cent.	Acidity per cent.
45	Spiced Vinegar,	0.39	4.64
46	Cider Vinegar,	2.98	4.13
47	Cider Vinegar,	1.77	5.85
48	Cider Vinegar,	1.82	4.04
49	Cider Vinegar,	1.91	4.11
50	Cider Vinegar,	2.65	4.05
51	Cider Vinegar,	2.91	4.45
52	Cider Vinegar,	2.59	4.25
53	Spiced Vinegar,	0.32	4.64
54	Cider Vinegar,	2.26	6.23
55	Cider Vinegar,	2.86	4.71
56	Cider Vinegar,	2.58	4.52
57	Cider Vinegar,	2.75	2.56
58	Cider Vinegar,	1.90	5.37
59	Cider Vinegar,	1.77	5.54
60	Cider Vinegar,	1.94	6.26
61	Cider Vinegar,	2.21	5.73
62	Cider Vinegar,	3.05	5.44
63	Cider Vinegar,	2.99	4.68
64	Cider Vinegar,	2.10	2.99
65	Cider Vinegar,	2.09	5.61
66	Cider Vinegar,	1.98	4.64
67	Cider Vinegar,	1.76	5.00
68	Cider Vinegar,	2.28	4.01
69	Cider Vinegar,	2.36	4.18
70	Cider Vinegar,	3.45	4.35
71	Cider Vinegar,	1.29	3.12
72	Cider Vinegar,	2.56	4.56
73	Cider Vinegar,	1.75	4.24
74	White Wine Vinegar,	0.26	4.79
75	Cider Vinegar,	2.84	3.52
76	Cider Vinegar,	2.96	4.01
77	Cider Vinegar,	1.98	4.94
78	Cider Vinegar,	2.51	4.58
79	Cider Vinegar,	2.36	5.53
80	Cider Vinegar,	1.82	4.01
81	Cider Vinegar,	1.24	5.66
82	Cider Vinegar,	2.28	4.35
83	Cider Vinegar,	2.92	4.47
84	Cider Vinegar,	1.80	5.19
85	Cider Vinegar,	2.09	5.34
86	Cider Vinegar,	2.35	3.57
87	Cider Vinegar,	2.15	5.81
88	Cider Vinegar,	2.12	2.44

No.	Kind.	Solids per cent.	Acidity per cent.
89	Cider Vinegar,	2.10	4.56
90	Cider Vinegar,	1.83	4.20
91	Cider Vinegar,	2.06	3.25
92	Cider Vinegar,	2.99	4.26
93	Cider Vinegar,	2.62	4.64
94	Cider Vinegar,	2.09	2.05
95	Cider Vinegar,	2.07	3.60
96	Cider Vinegar,	1.00	4.78
97	Cider Vinegar,	3.27	6.78
98	Cider Vinegar,	2.57	5.62
99	Cider Vinegar,	.39	4.36
100	Cider Vinegar,	2.40	3.37
101	Cider Vinegar,	1.63	3.67
102	Cider Vinegar,	3.52	4.38
103	Cider Vinegar,	2.10	4.24
104	Cider Vinegar,	2.15	4.45
105	Cider Vinegar,	2.01	4.07
106	Cider Vinegar,	1.75	3.97
107	Cider Vinegar,	1.79	5.25
108	White Wine Vinegar,	0.10	4.38
109	Cider Vinegar,	1.96	4.48
110	Cider Vinegar,	1.52	5.81
111	Cider Vinegar,	....	....
112	Cider Vinegar,	2.04	4.14
113	Cider Vinegar,	2.52	4.56
114	Cider Vinegar,	2.80	4.52
115	Cider Vinegar,	2.02	2.81
116	Cider Vinegar,	1.94	1.55
117	Cider Vinegar,	2.41	4.36
118	Cider Vinegar,	1.87	3.99
119	White Wine Vinegar,	0.21	4.40
120	Cider Vinegar,	2.05	3.67
121	Cider Vinegar,	2.00	4.34
122	Cider Vinegar,	5.28	4.40
123	Cider Vinegar,	3.58	4.37
124	Cider Vinegar,	2.68	3.86
125	Cider Vinegar,	2.07	4.48
126	Cider Vinegar,	2.46	4.58
127	Cider Vinegar,	2.13	4.34
128	Cider Vinegar,	2.48	4.52
129	Cider Vinegar,	3.81	2.00
130	Cider Vinegar,	2.07	3.91
131	Malt Vinegar,	2.06	4.89
132	Cider Vinegar,	2.95	4.38

No.	Kind.	Solids per cent.	Acidity per cent.
133	Cider Vinegar,	2.06	4.03
134	Malt Vinegar,	2.07	4.56
135	White Wine Vinegar,	0.28	5.00
136	Cider Vinegar,	3.04	4.64
137	Cider Vinegar,	2.38	4.46
138	Cider Vinegar,	2.76	3.86
139	Cider Vinegar,	2.23	4.89
140	White Wine Vinegar,	0.23	3.78
141	Cider Vinegar,	2.21	5.27
142	Cider Vinegar,	2.07	3.99
143	Cider Vinegar,	2.32	4.50
144	Cider Vinegar,	2.04	4.18
145	Cider Vinegar,	1.46	4.58
146	White Wine Vinegar,	0.43	4.07
147	Cider Vinegar,	2.11	3.35
148	Cider Vinegar,	4.42	3.56
149	Cider Vinegar,	3.01	1.89
150	Cider Vinegar,	4.06	2.40
151	Cider Vinegar,	3.14	2.77
152	Cider Vinegar,	3.72	1.46
153	Cider Vinegar,	4.92	2.51
154	Cider Vinegar,	4.54	3.23
155	Cider Vinegar,	3.87	2.29
156	Cider Vinegar,	4.32	3.07
157	Cider Vinegar,	3.68	2.00
158	Cider Vinegar,	3.64	2.76
159	Cider Vinegar,	3.25	2.08
160	Cider Vinegar,	3.70	2.29
161	White Wine Vinegar,	4.60	White Vin.
162	Cider Vinegar,	4.24	2.59
163	Cider Vinegar,	4.58	.29

VINEGAR STANDARDS.

CONNECTICUT.

Acidity, 4 per cent.

If cider vinegar, 2 per cent. solids.

Artificial coloring matter prohibited.

DISTRICT OF COLUMBIA.

Acetic acid, 5 per cent.

Solids, 1 5-10 per cent.

INDIANA.

Acidity, 4 per cent.

Cider vinegar, 2 per cent. solids.

Artificial coloring matter prohibited.

MASSACHUSETTS.

Acidity, $4\frac{1}{2}$ per cent.

Cider vinegar, 2 per cent. solids.

Artificial coloring matter deemed an adulteration.

BOSTON.

Acetic acid, 5 per cent.

MICHIGAN.

Fruit or grain vinegar, 4 per cent.

Acetic acid, foreign substances not allowed.

Coloring matter not permitted in distilled vinegar.

Fermented vinegar, $1\frac{3}{4}$ solids at a temperature of boiling water and $2\frac{1}{2}$ tenths of 1 per cent. ash or mineral matter.

Cider vinegar, $1\frac{3}{4}$ per cent. solids.

Foreign substances, drugs or acids prohibited.

MINNESOTA.

Acidity, 4 5-10 per cent.

Solids, $1\frac{3}{4}$ per cent.

Artificial coloring matter prohibited.

NEBRASKA.

Fruit or grain vinegar, 4 per cent.

Acetic acid.

Cider vinegar solids, 2 per cent.

Artificial coloring matter prohibited.

NEW YORK.

Acetic acid, 4 5-10 per cent.

Solids, 2 per cent.

Artificial coloring matter prohibited.

OHIO.

Cider vinegar acidity, 4 per cent.

Solids, 2 per cent.

Artificial coloring matter prohibited.

PENNSYLVANIA.

Cider vinegar acidity, 4 per cent.

Solids, $1\frac{1}{2}$ per cent. by weight at a temperature of boiling water.

Foreign substances, drugs or acids prohibited.

Fermented vinegar, not distilled, solids $1\frac{1}{2}$ per cent. by weight at a temperature of boiling water.

All fruit or grain vinegar, 4 per cent.

Foreign substances are prohibited, but spices necessary for flavoring, if they do not color the vinegar, are permitted.

WISCONSIN.

Acidity, 4 per cent.; if cider vinegar, 2 per cent. solids in addition.

Barrels containing vinegar are to be printed with the standard strength of contents, which shall be denoted by the strength of acetic acid.

MOLASSES.

The first law relating to the sale of molasses was passed in 1887 and was amended so as to make it much stronger in 1889. It is the duty of the dairy commissioner to attend to its enforcement. The law provides that any person who shall adulterate any molasses, or who shall sell or offer for sale, or expose for sale, or who shall solicit or receive any order for the sale or delivery in this state of any molasses adulterated with glucose, dextrose, salts of tin, terra alba, starch, sugar, or corn syrup, shall be fined not more than five hundred dollars or imprisoned not more than one year.

The adulteration of molasses has grown to be quite an extensive business and the large wholesale dealers in other states are constantly striving to find an outlet for it in all of the markets. Glucose is used largely as an adulterant. This can be detected readily by analysis. Other adulterants are also used, some of them more or less harmful to public health. There is no doubt that there is a great deal of molasses on the market which is of a very low and poor quality. The pure molasses has been mixed with cheap syrups, as was stated last year in an able review of this subject by the Hon. J. D. Dewell of New Haven.

The government places a duty on imported molasses of three cents a gallon if strength by the polariscope is under fifty-six and six cents a gallon if fifty-six per cent. or over. Much of the mixed goods will not test over forty. The point is well taken by Governor Dewell that there should be a standard for molasses the same as for vinegar.

Thorough investigation has been made in all parts of the state during the year. Stores in all of our large towns and cities have been visited and goods examined and a good many samples taken and sent to the Experiment Station for analysis. The results of these analyses are given below.

No adulterated molasses has been found in any of the wholesale

houses in the state, and the result of last year's prosecutions has been to lead all dealers to be more careful in purchasing. In some of the cases where adulterated goods were found, the dealers had purchased them innocently and in some cases because they were cheap in price.

The molasses law has certainly been a great protection to all consumers, and has resulted in excluding large quantities of cheap molasses from the state.

The law is here given.

LAW IN RELATION TO THE SALE OF MOLASSES.

SECTION 2620. It shall be the duty of the Dairy Commissioner to attend to the enforcement of the law against the adulteration of molasses and the sale of adulterated molasses, and, for the purposes of examining into suspected violations of such law, he shall, at all reasonable hours have free access to all places and premises where he suspects that molasses is adulterated or adulterated molasses is sold, and on tender of the market price of good molasses for the same, he may take from any person, firm, or corporation samples of molasses which he suspects is adulterated, and he may have samples of molasses suspected to be adulterated analyzed by any state chemist, or by the Experiment Station, and a sworn or affirmed certificate of such analysis shall be *prima facie* evidence of the ingredients and constituents of the samples analyzed; and if such analysis shall show that the molasses is adulterated, he shall make complaint to the proper prosecuting officer, that the person or persons who adulterated said molasses, or sold or exposed for sale such adulterated molasses, may be prosecuted.

SECTION 2621. Any person refusing the Dairy Commissioner or his deputy access, in a reasonable manner, and at a reasonable time for said purpose of examination, or refusing to sell samples, as hereinbefore provided, shall be fined not more than seven dollars, or imprisoned not more than thirty days, or both.

SECTION 2622. Any person who shall adulterate any molasses, or who shall sell, or offer or expose for sale, or who shall solicit or receive any order for the sale or delivery within this state, or for delivery without this state for shipment into this state, of any molasses adulterated with salts of tin, terra alba, glucose, dextrose, starch, sugar, corn, syrup, or other preparation of, or from starch, shall be fined not more than five hundred dollars, or imprisoned not more than one year, or both. The delivery of any of the above-mentioned preparations, upon any order solicited or received within this State, shall be conclusive evidence that the order, upon which such delivery was made, was for such articles, and shall render the person soliciting or receiving such order liable to the penalty above described.

Approved, June 21, 1889.

POLARIZATION
AFTER INVERSION.

No.	Direct Polarization Sugar Degrees.	Sugar Degrees.	At Tem. of.	Sugar Degrees at 86° C.	Kind of Molasses.	Retail or Wholesale.	County.
1	43.2				New Orleans,	Retail,	Windham.
2	41.2				New Orleans,	Retail,	"
3	41.4				Porto Rico,	Retail,	"
4							
5	41.0				Porto Rico,	Retail,	"
6	31.0				New Orleans,	Retail,	"
7	45.6				Porto Rico,	Retail,	"
8	40.0				New Orleans,	Retail,	"
9	45.0				Porto Rico,	Retail,	"
10	44.0				New Orleans,	Retail,	"
11	52.0	3.1	20		Porto Rico,	Retail,	"
12	26.0				New Orleans,	Retail,	New London.
13	40.6				Porto Rico,	Retail,	"
14	96.0	44.0	21	50.6	New Orleans,	Retail,	"
15	43.4				Porto Rico,	Retail,	Hartford.
16	45.0				New Orleans,	Retail,	"
17	19.2				Porto Rico,	Retail,	"
18	46.8				New Orleans,	Retail,	"
19	50.0				Porto Rico,	Retail,	"
20	116.0	96.0	23	94.0	New Orleans,	Retail,	Windham.
21	37.6				New Orleans,	Retail,	"
22	39.0				Porto Rico,	Retail,	"
23	45.6				New Orleans,	Retail,	"
24	45.4				Porto Rico,	Retail,	"
25	40.8				New Orleans,	Retail,	"
26	39.0				Porto Rico,	Retail,	"
27	40.0				New Orleans,	Retail,	"
28	40.6				New Orleans,	Retail,	"
29	45.0				Porto Rico,	Retail,	"
30	40.0				Porto Rico,	Retail,	"
31	41.6				New Orleans,	Retail,	"
32	45.6				Porto Rico,	Retail,	"
33	50.6				New Orleans,	Retail,	"
34	115.4	96.8	22	94.0	Porto Rico,	Retail,	"
35	40.8				Porto Rico,	Retail,	Tolland.
36	49.0				New Orleans,	Retail,	"
37	20.0				Ponce,	Retail,	"
38	49.0				New Orleans,	Retail,	"
39	43.6				Porto Rico,	Retail,	"
40	114.0	100.0	23	97.0	New Orleans,	Retail,	"

POLARIZATION
AFTER INVERSION.

No.	Direct Polarization Sugar Degrees.	Sugar Degrees.	At Tem. of.	Sugar Degrees at 86° C.	Kind of Molasses.	Retail or Wholesale.	County.
41	42.0				Porto Rico,	Retail,	Tolland.
42	36.8				New Orleans,	Retail,	"
43	29.2				Ponce,	Retail,	"
44	44.0				New Orleans,	Retail,	Hartford.
45	44.6				Porto Rico,	Retail,	"
46	38.2				New Orleans,	Retail,	"
47	35.6				Porto Rico,	Retail,	"
48	48.0				New Orleans,	Retail,	"
49	48.0				Porto Rico,	Retail,	"
50	54.4	4.0	24	18.0	New Orleans,	Retail,	"
51	39.0				Porto Rico,	Retail,	"
52	50.8	4.0	23	20.0	Porto Rico,	Retail,	"
53	46.0				New Orleans,	Retail,	"
54	45.0				Porto Rico,	Retail,	"
55	37.2				New Orleans,	Retail,	"
56	30.0				Porto Rico,	Retail,	"
57	30.8				New Orleans,	Retail,	"
58	82.6	44.0	23	52.4	New Orleans,	Retail,	Litchfield.
59	38.8				Porto Rico,	Retail,	"
60	60.0	24.4	24	34.0	New Orleans,	Retail,	"
61	44.0				Porto Rico,	Retail,	New London.
70	40.4				New Orleans,	Retail,	"
76	42.8	-19.8	20		Porto Rico,	Retail,	"
77	45.4	-13.2	20		New Orleans,	Retail,	"
78	52.0	-3.5	20		Porto Rico,	Retail,	Windham.
101	20.8				New Orleans,	Retail,	New Haven.
102	16.8				Porto Rico,	Retail,	"
103	43.4				New Orleans,	Retail,	"
104	40.8				New Orleans,	Retail,	"
105	48.6				Ponce,	Retail,	"
106	37.0	-14.0	22	5.2	Golden Drips,	Retail,	"
107	22.4				Ponce,	Retail,	"
108	45.6				Ponce,	Retail,	"
109	43.0				New Orleans,	Retail,	"
110	41.2				Ponce,	Retail,	"
111	49.0				Porto Rico,	Retail,	"
112	78.8	30.0	22	40.0	New Orleans,	Retail,	"
113	54.0	2.0	20		Porto Rico,	Retail,	"
114	51.0	-10.6	21	8.0	New Orleans,	Retail,	"
115	51.4	-13.0	21	8.0	Ponce,	Retail,	"

POLARIZATION
AFTER INVERSION.

No.	Direct Polarization Sugar Degrees.	Sugar Degrees.	At Tem. of.	Sugar Degrees at 86° C.	Kind of Molasses.	Retail or Wholesale.	County.
116	32.8				Ponce,	Retail,	New Haven.
117	40.6				New Orleans,	Retail,	"
118	44.0				Ponce,	Retail,	"
119	41.0				New Orleans,	Wholesale,	"
120	47.0				Ponce,	Retail,	"
121	39.2				New Orleans,	Wholesale,	"
122	45.0				New Orleans,	Retail,	"
123	39.6				New Orleans,	Retail,	"
124	112.6	84.0	21	76.0	New Orleans,	Retail,	"
125	45.0				New Orleans,	Retail,	"
126	43.4				Porto Rico,	Retail,	"
127	28.6				Ponce,	Retail,	"
128	41.6				Ponce,	Retail,	"
129	47.4				Porto Rico,	Retail,	"
130	32.8				New Orleans,	Wholesale,	"
131	38.2				New Orleans,	Wholesale,	"
132	44.0				Porto Rico,	Retail,	"
133	104.6	80.0	21	79.2	New Orleans,	Retail,	"
134	51.6	-12.0	21	8.0	Ponce,	Retail,	"
135	43.2				Ponce,	Retail,	Fairfield.
136	37.8				New Orleans,	Retail,	"
137	44.4				New Orleans,	Retail,	"
138	42.0				New Orleans,	Retail,	"
139	69.0	36.0	21	44.0	New Orleans,	Retail,	"
140	112.4	95.4	21	92.6	New Orleans,	Retail,	"
141	49.0				Ponce,	Retail,	"
142	40.2				New Orleans,	Retail,	"
143	40.6				Ponce,	Retail,	"
144	82.6	43.2	20	50.6	New Orleans,	Retail,	Middlesex.
145	82.4	42.2	21	49.4	New Orleans,	Retail,	"
146	49.2				Ponce,	Retail,	"
147	39.6				New Orleans,	Retail,	"
148	47.6				New Orleans,	Retail,	"
149	92.4	56.6	20	58.0	New Orleans,	Retail,	"
150	118.0	102.0	21	100.0	New Orleans,	Retail,	New Haven.
151	41.0				Porto Rico,	Retail,	"
152	45.6				Ponce,	Retail,	"
153	38.8				Ponce,	Retail,	"
154	96.4	70.6	21	74.0	Ponce,	Retail,	"
155	51.0	-14.0	21	-0.4	Ponce,	Retail,	"

POLARIZATION
AFTER INVERSION.

No.	Direct Polarization Sugar Degrees.	Sugar Degrees.	At Tem. of.	Sugar Degrees at 86° C.	Kind of Molasses.	Retail or Wholesale.	County.
156	125.6	113.0	21	108.0	New Orleans,	Retail,	New Haven.
157	123.0	111.4	21	104.0	New Orleans,	Retail,	"
158	20.8				Ponce,	Retail,	"
159	41.0				New Orleans,	Retail,	"
160	40.4				Ponce,	Retail,	"
161	39.0				Ponce,	Retail,	New London.
162	46.8				New Orleans,	Retail,	"
163	40.4				New Orleans,	Retail,	"
164	48.6				Ponce,	Retail,	"
165	42.4				New Orleans,	Retail,	"
166	20.4				Ponce,	Retail,	"
167	42.0				New Orleans,	Retail,	"
168	46.2				New Orleans,	Retail,	"
169	44.6				Ponce,	Retail,	"
170	46.6				New Orleans,	Retail,	"
171	46.2				New Orleans,	Retail,	"
172	44.8				Ponce,	Retail,	"
173	43.2				New Orleans,	Retail,	"
174	67.4	28.0	21	38.4	Ponce,	Retail,	Middlesex.
175	43.2				New Orleans,	Retail,	"
176	41.0				New Orleans,	Retail,	Fairfield.
177	62.8	14.2	22	28.0	Porto Rico,	Retail,	"
178	43.2				New Orleans,	Retail,	"
179	41.6				New Orleans,	Retail,	"
180	45.6				Porto Rico,	Retail,	"
181	101.2	74.0	22	78.0	New Orleans,	Retail,	"
182	48.4				New Orleans,	Retail,	"
183	31.2				Porto Rico,	Retail,	"
184	24.0				Ponce,	Retail,	"
185	40.0				New Orleans,	Retail,	"
186	48.0				New Orleans,	Retail,	"
187	51.4				New Orleans,	Retail,	"
188	35.2				Ponce,	Retail,	"
189	42.0				New Orleans,	Retail,	"
190	43.6				Ponce,	Retail,	"
191	42.0				New Orleans,	Retail,	"
192	48.4				Ponce,	Retail,	"
193	45.0				New Orleans,	Retail,	Litchfield.
194	50.2				Ponce,	Retail,	"
195	41.6				New Orleans,	Retail,	"

POLARIZATION
AFTER INVERSION.

No.	Direct Polarization Sugar Degrees.	Sugar Degrees.	At Tem. of.	Sugar Degrees at 86° C.	Kind of Molasses.	Retail or Wholesale.	County.
196	30.8				Porto Rico,	Retail,	Litchfield.
197	40.6				New Orleans,	Retail,	"
198	41.2				Ponce,	Retail,	"
199	37.2				Porto Rico,	Retail,	"
200	48.8				Ponce,	Retail,	"
201	43.2				New Orleans,	Retail,	"
202	51.6				Porto Rico,	Retail,	"
203	51.0				Ponce,	Retail,	"
204	51.0				Ponce,	Retail,	"
205	42.8				New Orleans,	Retail,	Fairfield.
206	49.0				Porto Rico,	Retail,	"
207	42.4				New Orleans,	Retail,	"
208	31.4				Porto Rico,	Retail,	"
209	42.4				New Orleans,	Retail,	"
210	30.0				Porto Rico,	Retail,	"
211	17.2				Porto Rico,	Retail,	"
212	41.4				New Orleans,	Retail,	"
213	41.0				New Orleans,	Retail,	"
214	39.2				Porto Rico,	Retail,	"
215	50.8				Ponce,	Retail,	"
216	128.6	119.0	22	114.0	New Orleans,	Retail,	"
217	48.0				New Orleans,	Retail,	New London.
218	45.8				Porto Rico,	Retail,	"
219	36.4				New Orleans,	Retail,	"
220	36.4				New Orleans,	Retail,	"

The following article is taken from the *New York Journal of Commerce* of recent date, and well explains the situation of the molasses trade at the present time :

THE CONTROVERSY OVER ADULTERATED MOLASSES.

DIFFERENT VIEWS EXPRESSED BY LEADING NEW YORK DEALERS.

Local dealers in molasses are much interested in the present agitation over pure and adulterated molasses and are awaiting the result of the investigation, which, it was announced yesterday, will be made by the Board of Health to discover to what extent adulterated molasses is sold in this city. There seems to be no doubt that the adulterated article is sold here, for some of the largest dealers yesterday frankly stated that such is the case, and one or two firms said that the percentage of pure molasses sold in this market was very small, comparatively. Others, however, did not

share this view, and, while admitting that the adulterated product is sold in this market, said that many of the leading wholesale grocers of this city bought large quantities of pure molasses.

A representative of Henry R. Hobart & Co. said that there is comparatively little demand for genuine molasses, and while they handled the pure article, they sell the adulterated molasses to a very large percentage of their customers. Fully 95 per cent. of the molasses sold here, he thought, was the mixed product. The reason the retailers buy the adulterated molasses, he said, was because there was a larger profit in it.

A member of the firm of N. W. Taussig & Co. expressed a somewhat different opinion. He said that while the adulterated molasses was sold, by far the greater bulk of their sales was of the pure article and that the largest wholesale grocers here buy the genuine "The canned article," he continued, "is adulterated, and necessarily so, for it would be impossible to prevent fermentation of the molasses unless some adulterant was added to keep it quiet. The retailers could get pure molasses if they desired, but they find a greater profit in handling the adulterated."

Another large dealer in lower Wall street said: "Retailers, I think, as a rule, believe they are buying pure molasses of the wholesale grocer, but as a matter of fact get the adulterated product. They sell it to-day for pure molasses at about the same prices that prevailed for the genuine article ten or fifteen years ago, when adulteration was not resorted to. The retailers, in many instances, buy this so-called pure molasses at from, say from 25 to 35 cents a gallon and sell it to the consumer at from 60 to 72 cents, or thereabouts. The jobber sells this same article to the wholesaler at prices ranging from say, 18 to 24 cents a gallon. Pure molasses, on the other hand, would cost the wholesaler anywhere from 20 to 35 cents a gallon, according to quality, and the retailer could purchase it at prices running from 25 to 40 cents per gallon. Wholesale grocers would, no doubt, much prefer to handle only genuine molasses, but they are forced to handle the adulterated article because of competition. There is a great deal of molasses sold here as pure Porto Rican molasses, wholesalers buying it from jobbers, as a rule, for 18 to 25 cents a gallon. Pure Porto Rican molasses cannot be sold here to wholesalers at less than 28 to 34 cents. One of the chief objections to the sale of adulterated molasses is the deception practiced on the public. The consumer thinks he is getting pure molasses but is given the adulterated, and at the same time pays high prices for it. All adulterated products, I think, should be branded as such so that consumers will know just what they are buying."

LAW RELATING TO THE MANUFACTURE AND SALE OF FOOD PRODUCTS.

The Connecticut Agricultural Experiment Station, under whose control this law was placed at its passage in 1895, has made a great many examinations of food products each year and the results of the analysis of the articles sampled have been published in their reports. These valuable reports, showing that in many of the foods there is quite an amount of adulteration, will be sent free to any one from the Station.

At the last session of the legislature this law was amended, giving to the dairy commissioner and his deputy power to take samples of food products and have them analyzed at the Station, and when samples taken by the Experiment Station or the dairy commissioner have been found to be adulterated, the result should be reported to the dairy commissioner for action. Under this law no dealer is liable to prosecution unless he sells food products knowingly adulterated.

Since the work of the Station has become known to the public through their reports, dealers are more careful in regard to the goods they purchase, and many of them at once stopped the sale of those articles which are found to be adulterated.

Quite a number of samples of coffee and olive oil have been taken by this department and sent to the Experiment Station for analysis. They were taken from stores in the different cities as they were found on sale. In order to comply with this law, notice will be sent to all dealers whose goods upon analysis are found to be adulterated. If they continue the sale, action will be brought against them.

The large amount of adulteration of food products throughout the country has led many states to pass strong laws on the subject, and the work accomplished under these laws has resulted in freeing the market from many cheap adulterated articles of food. Some of these contain ingredients which are not only fraudulent but are injurious to health.

We believe that the pure food law in Connecticut has been of great benefit to all consumers in the state, and that many of the poorer fraudulent articles have been exposed.

The law as it stands is here given.

The law and amendment is here given :

AN ACT REGULATING THE MANUFACTURE AND SALE OF FOOD PRODUCTS.

SECTION 1. It shall be unlawful for any person, persons, or corporation within this State to manufacture for sale, offer or expose for sale, have in his or their possession for sale, or to sell, any article of food which is adulterated or misbranded within the meaning of this act.

SEC. 2. The term food, as used in this act, shall include every article used for food or drink by man, horses or cattle. The term misbranded, as used in this act, shall include every article of food and every article which enters into the composition of food, the package or label of which shall bear any statement purporting to name any ingredient or substance as not being contained in such article, which statement shall be untrue in any particular; or any statement purporting to name the substance or substances of which such article is made, which statement shall not give fully the names of all substances contained in such article in any measurable quantity.

SEC. 3. For the purposes of this act, an article shall be deemed adulterated: First, if any substance or substances be mixed or packed with it so as to reduce or lower or injuriously affect its quality or strength; second, if any inferior substance or substances be substituted wholly or in part for the article; third, if any valuable constituent of the article has been wholly or in part abstracted; fourth, if it be an imitation of or sold under the name of another article; fifth, if it is colored, coated, polished or powdered whereby damage is concealed, or if it is made to appear better or of greater value than it is; sixth, if it contains poisonous ingredients which may render such article injurious to the health of a party consuming it, or if it contain any antiseptic or preservative not evident and not known to the purchaser or consumer; seventh, if it consists in whole or in part, of a diseased, filthy, decomposed, or putrid substance, either animal or vegetable, unfit for food, whether manufactured or not, or if it is in any part the product of a diseased animal, or of any animal that has died otherwise than by slaughter; *Provided*, that an article of food product shall not be deemed adulterated or misbranded within the meaning of this act in the following cases: (a) In the case of mixtures or compounds which may be now or from time to time hereafter known as articles of food under their own distinctive names, and not included in definition fourth of this section; (b) in the case of articles labelled, branded or tagged, so as plainly and correctly to show that they are mixtures, compounds, combinations, or blends; (c) when any matter or ingredient is added to a food because the same is required for the protection or preparation thereof as an article of commerce in a fit state for carriage or consumption, and not fraudulently to increase the bulk, weight or measure of the food or to conceal the inferior quality thereof; (d) when a food is unavoidably mixed with some extraneous matter in the process of collection or preparation.

SEC. 4. The Connecticut Agricultural Experiment Station shall make

analysis of food products on sale in Connecticut, suspected of being adulterated, at such times and places and to such an extent as it may determine, and may appoint such agent or agents as it deems necessary; who shall have free access, at all reasonable hours, for the purpose of examining into any place wherein it is suspected any article of food adulterated with any deleterious or foreign ingredient or ingredients exists, and such agent or agents upon tendering the market price of said article, may take from any person, firm or corporation samples of any article suspected of being adulterated as aforesaid, and the said station may adopt or fix standards of purity, quality, or strength, when such standards are not specified or fixed by statute.

SEC. 5. Whenever said station shall find by its analysis that adulterated food products have been on sale in the State, it shall forthwith transmit the facts so found to a grand juror or prosecuting attorney of the town in which said adulterated food product was found.

SEC. 6. The said station shall make an annual report to the Governor upon adulterated food products, in addition to the reports required by law, which shall not exceed one hundred and fifty pages, and said report may be included in the report which said station is already authorized by law to make and such annual reports shall be submitted to the General Assembly at its regular session.

SEC. 7. To carry out the provisions of this act, the additional sum of twenty-five hundred dollars is hereby annually appropriated to said Connecticut Agricultural Experiment Station, which sum shall be paid in equal quarterly instalments to the treasurer of the board of control of said station, upon the order of the comptroller, who is hereby directed to draw his order for the same.

SEC. 8. Any person who, either by himself, his agent, or attorney, with the intent that the same may be sold as unadulterated, adulterates any food products for man, or horses, or cattle, or, knowing that the same has been adulterated, offers for sale, or sells the same as unadulterated, or without disclosing or informing the purchaser that the same has been adulterated, shall be fined not more than five hundred dollars, or imprisoned not more than one year.

SEC. 9. No action shall be maintained in any court in this State on account of any sale or other contract made in violation of this act.

SEC. 10. All acts and parts of acts inconsistent herewith are hereby repealed.

Approved, June 26, 1895.

AN ACT AMENDING AN ACT REGULATING THE MANUFACTURE AND SALE OF
FOOD PRODUCTS.

SECTION 1. Sections four and five of Chapter ccxxxv. of the Public Acts of 1895 are hereby amended to read as follows :

SEC. 4. The Connecticut Agricultural Experiment Station shall make

analysis of food products on sale in Connecticut, or kept in Connecticut for export, to be sold without the State, suspected of being adulterated. Samples of food products for analysis shall be taken by the duly authorized agents of the Station, or by the Dairy Commissioner or his deputy, at such times and places and to such an extent as in the judgment of the officers of the Experiment Station and of the Dairy Commissioner shall seem expedient. The Dairy Commissioner or his deputy shall have full access at all reasonable hours to any place wherein it is suspected that there is kept for sale or for export, as above specified, any article of food adulterated with any deleterious or foreign ingredient or ingredients, and said Dairy Commissioner or his deputy, upon tendering the market price of such article, may take from any person, firm or corporation, samples of the same. The said Experiment Station may adopt or fix standards of purity, quality, or strength, when such standards are not specified by law.

SEC. 5. Whenever said Experiment Station shall find by its analysis that adulterated food products have been on sale in the State, or kept in the State for export, for sale without the State, it shall forthwith transmit the facts so found to the Dairy Commissioner, who shall make complaint to the proper prosecuting officer, to the end that violators of the law relating to the adulteration of food products shall be prosecuted.

SEC. 2. This act shall take effect from its passage.

Approved March 23, 1899.

THE LAW REGULATING THE SALE OF CONCENTRATED COMMERCIAL FEEDING STUFFS.

This law is one that is of great interest and importance not only to all of the dairymen of the state, but to every one who is purchasing feeds of every kind. While we grow quite large amounts of grain here in Connecticut it is small compared to the whole amount used. All practical dairymen know that it is of great importance that right kinds of feed are used and right proportions maintained to gain the best results from their cows. To do this they must be sure of the quality of the goods they purchase. To have cows do their best and give the largest return for the cost expended their feed must contain a certain amount of protein, carbohydrates and fat. The most expensive of these is protein, that portion of the feed which is flesh forming and milk producing and is that part which we usually have to purchase. All of the concentrated feeds such as cottonseed meal, oil meal, gluten meal are rich in protein, or are supposed to be, and as these feeds are quite costly it is important that we are sure of securing a good pure article, some of these have

of late years been found to vary very largely in their analysis, so that the difference in their feeding value was sometimes very great. All dairymen desire to know just the constituent parts of the feed they are using, they want to know just the proportions of each kind used in order to make that mixture which will give the best results. That they may do this they must know whether they are getting pure goods of standard quality. This law was passed for the purpose of giving them this security and to provide against the sale of those feeds which were low in feeding value for good, pure, high-grade goods. Cottonseed meal which is the richest feed in protein that we have running as high as thirty-seven per cent. is now sold almost entirely under a guarantee. Gluten meals and all meals are all sold with the percentages given. The Connecticut Experiment Station has collected a large number of samples of all standard brands as well as other feeds and have analyzed them and their reports show the percentages of protein and other constituents of the feed. Tags have been prepared showing the average percentage of protein and fat in bran, mixed feeds, and middling, these tags can be used when the analysis is not stamped on the sides. There has been some objection made to bran and mixed feeds being included in this law requiring them to be tagged, but we believe that the law was drawn with the best interests of all purchasers of feed, as we find sometimes upon the market very low quality of bran which has been adulterated largely with corn cobs and its feeding value very much reduced. This law is a protection to all purchasing feed and will eventually have the effect to cleanse the market from goods that will not bear the light of analysis. A good deal of time has been taken in looking into the condition of trade and seeing that the provisions of the law are complied with. Nearly all the dealers think that the law is a good one, as they wish to sell a good article, one that gives satisfaction and is true to its name and brand. It certainly is a safe guard to all purchasers of feed and will prevent their being defrauded by having to pay full price for those feeds that are of low quality, and will give good grounds for prosecution if the goods do not stand up to the guarantee. Careful work will be done under this law the coming season as the dealers in the state are now fully aware of its provisions. The law as enacted is here given:

AN ACT CONCERNING THE REGULATION OF THE SALE OF CONCENTRATED COMMERCIAL FEEDING STUFFS.

SECTION 1. Every lot or parcel of concentrated commercial feeding stuff, as defined in section three of this act, used for feeding domestic animals, sold, offered or exposed for sale within this State, shall have affixed thereto in a conspicuous place on the outside thereof, a legible and plainly printed statement, clearly and truly certifying the number of net pounds of feeding stuff contained therein, the name, brand or trade mark under which the article is sold, the name and address of the manufacturer or importer, and a statement of the percentage it contains of crude fat and of crude protein, allowing one per cent. of nitrogen to equal six and one-fourth per cent. of protein, both constituents to be determined by the methods adopted at the time by the Association of Official Agricultural Chemists of the United States.

SEC. 2. The term concentrated commercial feeding stuff as herein used, shall not include hay and straws, the whole seeds nor the unmixed meals made directly from the seed of wheat, rye, barley, oats, Indian corn, buckwheat, or broom corn

SEC. 3. The term concentrated commercial feeding stuff as herein used, shall include linseed meals, cotton seed meals, pea meals, cocoanut meals, gluten meals, gluten feeds, maize feeds, starch feeds, sugar feeds, dried brewers' grains, malt sprouts, hominy feeds, cerealine feeds, rice meals, oat feeds, corn and oat chop, corn and oat feeds, ground beef, or fish scraps, mixed feeds, provenders bran, middlings, and mixed feeds made wholly or in part from wheat, rye, or buckwheat, and all materials of a similar nature not included in section two of this act.

SEC. 4. Each and every manufacturer, importer, agent, or seller of any concentrated commercial feeding stuff shall, upon request, file with the Connecticut Agricultural Experiment Station, a certified copy of the statement named in section one of this act.

SEC. 5. Each and every manufacturer, importer, agent, or person selling, offering or exposing for sale in this State any concentrated commercial feeding stuff, as defined in section three of this act without the statement required by section one of this act, and stating that said feeding stuff contains substantially a larger percentage of either of the constituents mentioned in section one, than is contained therein, or in relation to which the provisions of all of the foregoing sections have not been fully complied with, shall be fined not exceeding one hundred dollars for the first offense, and not exceeding two hundred dollars for each subsequent offense.

SEC. 6. The Connecticut Agricultural Experiment Station is hereby authorized to have collected a sample not exceeding two pounds in weight, for analysis from any lot, parcel, or package of concentrated commercial feeding stuff as defined by section three of this act, or unmixed meals, brans, or middlings named in section two of this act, which may be in the

possession of any manufacturer, importer, agent, or dealer, but said sample shall be taken in the presence of said party or parties in interest or their representatives, and taken from a number of parcels or packages which shall be not less than five per cent. of the whole lot inspected, and shall be thoroughly mixed, divided into two samples, placed in glass vessels, carefully sealed, and a label placed on each stating the name or brand of the feeding stuff or material sampled, the name of the party from whose stock the sample was taken, and the time and place of taking the same, and said label shall be signed by said chemist or his deputy, and by the party or parties in interest or their representatives present at the taking and sealing of said sample; one of said samples shall be retained by said chemist or his deputy, and the other by the party whose stock is sampled. Said Connecticut Agricultural Experiment Station shall cause at least one sample of each brand of feeding stuff collected as herein provided to be analyzed annually by or under the direction of said chemist. Said analysis shall include determinations of crude fat and crude protein and such other determinations as may at any time be deemed advisable. Said Connecticut Agricultural Experiment Station shall cause the analysis so made to be published in station bulletins, together with such other additional information in relation to the character, composition and use thereof as may seem to be of importance, and issue the same annually, or more frequently if deemed advisable.

SEC. 7. It shall be the duty of the Dairy Commissioner to attend to the enforcement of this act, and, when any evidence is submitted by the Connecticut Agricultural Experiment Station that the provisions of this act have been violated, he shall make complaint to the proper prosecuting officer, to the end that the violator may be prosecuted.

SEC. 8. The term importer for all the purposes of this act is intended to apply to such person or persons as shall bring into or offer for sale within this State, concentrated commercial feeding stuffs manufactured without this State.

SEC. 9. This bill shall not apply to feed ground from whole grain and sold directly from manufacturer to consumer.

SEC. 10. All acts or parts of acts inconsistent herewith are hereby repealed.

SEC. 11. This act shall take effect on and after July 1, 1899.

Approved June 20, 1899.

UNITED STATES DEPARTMENT OF AGRICULTURE, 1900.

Secretary, JAMES WILSON.

Assistant Secretary, J. H. BRIGHAM.

Bureau of Animal Industry :

Chief, D. E. SALMON.

Assistant Chief, A. D. MELVIN.

Dairy Division :

Chief, HENRY E. ALVORD.

Assistant Chief, R. A. PEARSON.

STATE OFFICIALS IN CHARGE OF AGRICULTURE.

Secretary of Agriculture.

Pennsylvania,	John Hamilton,	Harrisburg.
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Commissioners of Agriculture.

Alabama,	Isaac F. Culver,	Montgomery.
Arkansas,	Frank Hill,	Little Rock.
Florida,	L. B. Wombwell,	Tallahassee.
Georgia,	O. B. Stephens,	Atlanta.
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Montana,	J. W. Calderhead,	Helena.
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North Carolina,	S. L. Patterson,	Raleigh.
North Dakota,	H. U. Thomas,	Bismarck.
South Carolina,	A. P. Butler,	Columbia.
Tennessee,	Thos. H. Paine,	Nashville.
Texas,	Jeff Johnson,	Austin.
Virginia,	Geo. W. Koiner,	Richmond.
Washington,	W. P. C. Adams,	Olympia.

State Engineer.

Idaho,	F. J. Mills,	Boise.
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Secretaries of State Boards of Agriculture.

California,	Peter J. Shields,	Sacramento.
Colorado,	A. M. Hawley,	Fort Collins.
Connecticut,	T. S. Gold,	West Cornwall.
Delaware,	Manlove Hayes,	Dover.
Illinois,	W. C. Garrard,	Springfield.
Indiana,	Chas. F. Kennedy,	Indianapolis
Kansas,	F. D. Coburn,	Topeka.
Maine,	B. Walker McKeen,	Augusta

Massachusetts,	J. W. Stockwell,	Boston.
Michigan,	I. H. Butterfield,	Agricultural College.
Missouri,	J. R. Rippey,	Columbia.
Nebraska,	R. W. Furnas,	Brownville
Nevada,	Louis Bevier,	Carson City.
New Jersey,	Franklin Dye,	Trenton.
New Hampshire,	N. J. Bachelder,	Concord.
North Carolina,	T. K. Bruner,	Raleigh.
Ohio,	W. W. Miller,	Columbus.
Oregon,	C. D. Gabrielson.	Salem
Rhode Island,	George A. Stockwell,	Providence.
South Dakota,	Walter B. Dean,	Yankton.
Utah,	H. P. Folsom,	Salt Lake.
Vermont,	C. J. Beil,	East Hardwick.
West Virginia,	J. B. Garvin,	Charleston.
Wisconsin,	John M. True,	Madison.

Commissioner of Agriculture and Forestry.

Hawaii,	Byron Clark,	Honolulu.
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SECRETARIES OF STATE AGRICULTURAL SOCIETIES.

Georgia,	J. Pope Brown,	Hawkinsville.
Iowa,	G. H. Van Houten,	Des Moines.
Louisiana,	E. L. Woodside,	Baton Rouge.
Maine,	G. M. Twitchell,	Augusta.
Minnesota,	E. W. Randall,	Hamline.
Montana,	Francis Pope,	Helena.
Nevada,	Wm. Hy. Doane,	Reno.
New York,	James B. Docharty,	Albany.
North Carolina,	Joseph E. Pogue,	Raleigh.
Pennsylvania,	Hiram Young,	York.
South Carolina,	T. W. Holloway,	Pomaria.
Vermont,	Henry Clark,	Rutland.

NATIONAL LIVE STOCK ASSOCIATION.

(Organized January 25, 1898.)

President, John W. Springer, Denver; Secretary, Charles F. Martin, Denver

DAIRY OFFICIALS.

National Association of Dairy and Food Departments.—Secretary, J. B. Noble, Hartford, Conn.

National Dairy Union.—Secretary, Charles Y. Knight, 188 South Water Street, Chicago, Ill.

National Creamery Buttermakers' Association.—Secretary, E. Sudendorf, Elgin, Ill.

New England Milk Producers' Union.—Secretary, L. S. Haywood, Pomfret Center, Conn.

Five States Milk Producers' Association.—Secretary, H. T. Coon, Little York, N. Y.

Columbia River Dairy Association.—Secretary, H. T. French, Moscow, Idaho.

ALABAMA.

Alabama Dairymen's Association.—Secretary, F. H. Bates, Hamburg.

CALIFORNIA.

State Dairy Bureau —Secretary and agent, William Vanderbilt, 114 California Street, San Francisco.

California Dairy Association.—Secretary, Samuel E. Watson, 421 Market Street, San Francisco.

Dairymen's Association of Southern California.—Secretary, James R. Boal, 126 West Twenty-fifth Street, Los Angeles.

COLORADO.

Dairy Commission.—Commissioner, T. L. Monson, Denver.

State Dairymen's Association.—Secretary, A. M. Hunter, Boulder.

CONNECTICUT.

Dairy Commission.—Commissioner, John B. Noble, Hartford; R. O. Eaton, deputy, New Haven.

Connecticut Dairymen's Association.—Secretary, George E. Manchester, Station A. Winsted.

Connecticut Creamery Association.—Secretary, Frank Avery, Manchester.

Jersey Cattle Breeders' Association.—S. C. Colt, President, Elmwood; R. A. Potter, Secretary, Bristol.

GEORGIA.

Georgia Dairymen's Association.—Secretary, M. L. Duggan, Sparta.

ILLINOIS.

Food Commissioner.—Commissioner, Alfred M. Jones, Room 1623 Manhattan Building, Chicago.

Illinois State Dairymen's Association.—Secretary, George Caven, 188 South Water Street, Chicago.

Chicago Milk Shippers' Union.—Secretary, S. Hill, 94 La Salle Street, Chicago.

INDIANA.

State Dairy Association.—Secretary, H. E. Van Norman, Lafayette.

IOWA.

Dairy Commission.—Commissioner, B. P. Norton, Des Moines.

Iowa State Dairy Association.—Secretary, J. C. Daly, Charles City.

KANSAS.

Kansas State Dairy Association.—Secretary, A. L. Goble, Riley.

MAINE.

Maine Dairymen's Association.—Secretary, L. W. Dyer, Cumberland Center.

MASSACHUSETTS.

Dairy Bureau.—Assistant executive officer, George M. Whitaker, Box 1332, Boston.

Massachusetts Creamery Association.—Secretary, A. W. Morse, Belcher-town.

MICHIGAN.

Dairy and Food Commission.—Commissioner, Elliot O. Grosvenor, Lansing.

Michigan Dairymen's Association.—Secretary, S. J. Wilson, Flint.

MINNESOTA.

Dairy and Food Commission.—Commissioner, J. M. Bowler, St. Paul.

Minnesota State Dairymen's Association.—Secretary, Robert Crickmore, Pratt.

Minnesota State Butter and Cheese Makers' Association.—Secretary, J. K. Bennett, Clinton Falls.

MISSOURI.

Missouri Dairymen's Association.—Secretary, Levi Chubbuck, 1214 Chemical Building, St. Louis.

NEBRASKA.

Food Commission.—Deputy Commissioner, F. B. Hibbard, Lincoln.

Nebraska Dairymen's Association.—Secretary, S. C. Bassett, Gibbon.

NEW HAMPSHIRE.

Granite State Dairymen's Association.—Secretary, J. L. Gerrish, Contoocook.

NEW JERSEY.

Dairy Commission.—Commissioner, George W. MacGuire, Trenton.

New Jersey State Dairy Union.—Secretary, G. L. Gillingham, Moores-town.

NEW YORK.

Department of Agriculture (including dairy).—Commissioner, Charles A. Wieting, Albany.

New York State Dairymen's Association.—Secretary, W. W. Hall, Gouverneur.

NORTH CAROLINA.

North Carolina State Dairymen's Association.—Secretary, C. W. Gold, Wilson.

NORTH DAKOTA.

Commission of Agriculture.—Commissioner (and ex officio State dairy commissioner), H. U. Thomas, Bismarck.

North Dakota State Dairymen's Association.—Secretary, E. E. Kaufman, Fargo.

OHIO.

Dairy and Food Commission.—Commissioner, Joseph E. Blackburn, Columbus.

Ohio State Dairymen's Association.—Secretary L. P. Bailey, Tacoma.

Ohio Dairy Union.—Secretary, F. A. Stranahan, 30 Huron Street, Cleveland.

OREGON.

State Dairy and Food Commission.—Commissioner J. W. Bailey, Portland.

Oregon Dairymen's Association.—Secretary, F. L. Kent, Corvallis.

PENNSYLVANIA.

Dairy and Food Commission (of State Department of Agriculture).—Commissioner, Jesse K. Cope, Harrisburg.

Pennsylvania State Dairy Association.—Secretary, A. L. Wales, Corry.

Pennsylvania Dairy Union.—Secretary, H. Hayward, State College.

Creamery Association of Eastern Pennsylvania.—Secretary, George R. Meloney, 1937 Market Street, Philadelphia.

SOUTH DAKOTA.

South Dakota Dairy and Buttermakers' Association.—Secretary, C. P. Sherwood, Desmet.

TENNESSEE.

East Tennessee Dairy Association.—Secretary, Paul F. Kefauver, Madisonville.

TEXAS.

Dairymen's Association.—Secretary, J. E. Maguire, Waco.

UTAH.

Food and Dairy Commission.—Commissioner, H. J. Faust, Jr., Salt Lake City.

Utah Dairymen's Association.—Secretary, F. B. Linfield, Logan.

VERMONT.

Vermont Dairymen's Association.—Secretary, F. L. Davis, North Pomfret.

WASHINGTON.

Dairy and Food Commission.—Commissioner, E. A. McDonald, Seattle.

Washington State Dairymen's Association.—Secretary, D. S. Troy, Chiacum.

WISCONSIN.

Dairy and Food Commission.—Commissioner, H. C. Adams, Madison.

Wisconsin Dairymen's Association.—Secretary, George W. Burchard, Fort Atkinson.

Wisconsin Cheesemakers' Association.—Secretary, U. S. Baer, Madison.

EXPENSES.

For the year ending September 30, 1900.

Salary of Commissioner.....	\$1,500 00
Office and traveling expenses.....	813 56
Salary Deputy Commissioner.....	1 200 00
Traveling expenses of deputy.....	698 46

CONCLUSION.

The several laws under which this department is working at present makes the field a large and important one. The dairy laws were enacted not alone for the protection of the dairymen of the state but that all consumers of those products should be enabled to know just what they were purchasing, and not be deceived and defrauded. The strong laws which have been enacted by many of the different states are absolutely necessary to help the dairy interest of our country and to protect all consumers against fraud. While obstacles sometimes arise which interfere with the proper administration of the law we feel confident that the people are much interested in the matter and desire a careful and thorough enforcement of all pure food laws. The state has been well covered by myself or deputy during the year, every city and nearly every town and

village has been visited, some of them several times, careful examinations have been made of all those articles over which we have jurisdiction and quite a large number of samples have been taken, sent to the experiment station for analysis of which mention has been made. The question of pure food of all kinds is attracting great attention all over our county and each year the feeling grows stronger against any kind of adulteration and fraudulent manufacture and sale of those articles which are used for human consumption. While we believe that the careful administration of the various state laws already enacted will go a great way toward lessening the evil of adulteration, the fact becomes more apparent each year that there should be more stringent national legislation on the matter.

The "Grout Bill" if it becomes a law will be a great help to the dairy laws in the several states in restricting the fraudulent sale of oleomargarine, and the passage of the "Brosius" or "Babcock" pure food bill or some legislation along the same lines will be a great step in advance towards lessening the sale of all kinds of adulterated food. In conclusion I desire to express my grateful appreciation for all favors received from the officers of the Connecticut Agricultural Experiment Station, the different revenue officers and court officers throughout the state, the Dairymen's Association, the Creamery Association for assistance rendered, and for the hearty support of the people of the state in all of the duties of the office.

Respectfully submitted,

J. B. NOBLE,

Dairy Commissioner.

State of Connecticut
PUBLIC DOCUMENT No. 38.

ANNUAL REPORT
OF
COMMISSIONER ON DOMESTIC ANIMALS
TO
THE GOVERNOR,
For the Year Ended September 30, 1900:

PRINTED BY ORDER OF THE LEGISLATURE.

PRESS OF
INSTITUTE FOR THE BLIND,
236 WETHERSFIELD AVE., HARTFORD.

STATE OF CONNECTICUT.

OFFICE OF THE

COMMISSIONER ON DOMESTIC ANIMALS.

ROOM 54, CAPITOL, HARTFORD.

TELEPHONE CALL, 1303.

HEMAN O. AVERILL, *Commissioner*.
WASHINGTON DEPOT, CONN.

B. WINONA PAGE.
Clerk and Stenog.

*To His Excellency George E. Lounsbury, Governor of the State
of Connecticut:*

SIR:---Complying with the law of the state, I have the honor
to hand you herewith my report for the fiscal year ending Sep-
tember 30, 1900.

Very respectfully,

HEMAN O. AVERILL,

Com. on Domestic Animals.

The law creating this department and from which it derives its authority is as follows:

STATE OF CONNECTICUT.

CHAPTER CXCIX, PUBLIC ACTS OF 1897.

An Act in Relation to Domestic Animals.

SECTION 1. When any person shall bring any cattle from an adjoining state into this state, he shall, within six days thereafter, notify the commissioner on domestic animals hereinafter appointed, and such notice shall contain the number and sex of such animals, and a true statement of their physical condition. Every person who shall knowingly violate any of the provisions of this section shall be fined not more than fifty dollars.

Sec. 2. When any contagious disease exists among domestic animals in this state, said commissioner may quarantine all animals infected with a contagious disease and prohibit the sale of all the products thereof; but no animal shall be quarantined that does not give evidence of disease by competent physical examination, and no animal shall be quarantined for more than thirty days.

SEC. 3. If it shall appear to said commissioner that it would be for the good of the state that animals so quarantined should be destroyed, he may cause said animals to be killed; but no animal so quarantined shall be killed until its value has been adjudged by the owner and the commissioner, and if they cannot agree each shall choose a representative, who shall choose a third, and the three so chosen shall determine the value of the animal, and the value thus determined shall, when approved by the commissioner, be paid to said owner by the state, upon the order of the comp-

troller. But no animal whose physical condition indicates that it is of no real value, and no animal that has not been in this state six months prior to its quarantine, shall be paid for by the state.

SEC. 4. The commissioner shall, at the request of the owner of any domestic animal or animals in this state, inspect the same by physical examination, and if he find them free from disease dangerous to the public health, he shall so certify to the owner.

SEC. 5. It shall be the duty of the selectmen in each town to report to the commissioner any animals infected with contagious disease.

SEC. 6. For the purpose of carrying out the provisions of this act, the governor shall biennially appoint a commissioner on domestic animals, who shall be a practical farmer and stock-breeder of at least ten years' experience. Said commissioner shall receive a salary of fifteen hundred dollars per annum and his expenses, while performing the duties of his office; he shall hold his office for the term of two years from and after the date of his appointment, and he may, with the approval of the governor, employ such assistants as may be necessary to discharge the duties of his office, and any expense so incurred shall be paid by the state upon the approval of the governor, and said commissioner shall annually report to the governor concerning his acts and expenses.

SEC. 7. Sections 1699, 1700, 1701, 1702, 1703, 1707 and 1709, of the general statutes, and chapter cclxxxviii of the public acts of 1895, and all acts or parts of acts inconsistent herewith are hereby repealed.

Approved, June, 2, 1897.

SECTION 2664, General Statutes. Any person who shall knowingly sell, or expose for sale, milk, or any product of milk, from any cow which shall have been adjudged, by the Commissioner of Domestic Animals, affected with tuberculosis, or other blood disease shall be fined not more than seven dollars, or imprisoned not more than thirty days, or both.

RECORDS.

For the fiscal year ending September 30, 1900, the records of this department show the following:

Number of calls received to examine suspicious cases of bovine tuberculosis		172
Number of cattle examined in response to these calls		385
Number herds inspected furnishing milk to Boston market		246
Number of cattle inspected furnishing milk to Boston market		3017
Number herds inspected furnishing milk to Norwalk and South Norwalk		87
Number of cattle inspected furnishing milk to Norwalk and South Norwalk		822
Total number of cattle condemned		118
Total amount allowed for same	\$ 1802 00	
Average price per head	15 27	
Salary of Commissioner	1500 00	
Salary of Clerk	260 00	
Traveling and Office Expenses	681 64	
Paid Veterinarians and Expenses	166 50	
Total expenses of the department including compensation for cattle		\$ 4410 14

In the above item, "Paid veterinarians and expenses \$166.50" is included the pay and expenses of Hon. Frank Day and Dr. Mayo, who acted as deputies in the work of inspecting the cows furnishing milk for Boston market.

This work was done in response to many calls from farmers in New London, Windham, and Tolland Counties who ship milk to Boston, and was made necessary by the action of the Boston Board of Health in 1899, in adopting in their "Regulations for the Sale and Care of Milk" the following section:

"ARTICLE I, SEC 4. No milk shall be sold, offered for sale, or distributed in the city of Boston unless the cows from which

it is derived have, within one year, been examined by a competent authority and shown to be free from diseases dangerous to public health; but this shall not be construed as forbidding the sale or use of milk from cows not tested with tuberculin."

Similar Board of Health regulations in the cities of Norwalk and South Norwalk necessitate an annual inspection under the supervision of this department of all cows furnishing milk for these cities.

Complying with Section 1, Chapter excix, Public Acts of 1897, the following described cattle have been reported to this department as having been brought into this state during the fiscal year ending September 30, 1900.

Cows 949, heifers 281, oxen 54, steers 522, bulls 54, calves 93.

Total.....1,953.

During the year ending December 31, 1896.....12,571.

During the year ending September 30, 1898.....5,193.

During the year ending September 30, 1899.....3,573.

Marked copies of the law relating to bringing cattle into this state from an adjoining state with envelopes and blanks for convenience in reporting have been sent to dealers and importers as far as their addresses could be obtained, yet, notwithstanding this, comparison with the three preceding years shows such a decrease in numbers reported as to indicate beyond doubt that the law is not generally respected.

It is certainly no hardship for a dealer to fill out a blank furnished from this office, inclose it in the envelope, also furnished, and mail it to this office. This neglect on the part of the dealer is undoubtedly the result of carelessness rather than willfulness.

Bovine tuberculosis is the only contagious disease that exists among the cattle in the State that is recognized as dangerous to the public health and every animal which has been found by the Commissioner to be affected with this disease, by a physical examination, has been condemned, killed and buried.

In every such case the owner and the Commissioner have been able to agree upon price to be paid by the State. The voluntary extinction of bovine tuberculosis by the owner will be greatly encouraged and aided by educating the farmer and herdsman respecting the disease so that they will be able to diagnose it in its earlier stages, before it reaches the later and more contagious, and consequently more dangerous form; and to realize the importance of having all diseased animals slaughtered at once, and their stalls, etc., thoroughly cleansed and sterilized. To carry on a campaign of instruction as well as wage a war of destruction should be the constant aim and effort of this Department.

Since 1882 when Robert Koch, a celebrated German scientist, discovered the tubercle bacillus which demonstrated tuberculosis to be a contagious disease, scientists, medical men, and veterinarians the world over have given the matter much study.

A great number of very careful experiments have been conducted on cattle and smaller animals by conscientious seekers after the truth in the effort to determine if possible if the disease is communicable from one animal to another animal of the same order and from an animal of one order to an animal of a higher or lower order, and from the human family to animals of the lower orders. As a result of these experiments there is a consensus of opinion among scientific men that tuberculosis may be transmitted from one animal to another of the same order, and when the most favorable conditions exist it may be transmitted from the human to the bovine and other animals of the lower orders.

These experiments indicate that it is much more difficult to inoculate animals with virus taken from an animal of another order than it is with virus taken from another animal of its own order, and when this has been successfully accomplished a milder type of the disease has resulted. Owing to the sacredness of human life no experiments have been undertaken to determine if the disease may be communicated from a cow to a human being,

so that in the absence of any positive proof to the contrary we are morally bound to remember that the accused is entitled to the benefit of a reasonable doubt, and laying aside the weak circumstantial evidence that has been presented pronounce our verdict in the case in favor of the cow: "Not guilty because the charges are not proven."

TUBERCULOSIS—HOW TRANSMITTED.

Tuberculosis may be transmitted from one animal to another in three ways:

FIRST, by inoculation or through the circulation.

SECOND, by ingestion or through the food channels.

THIRD, by inhalation or through the respiratory organs.

As tuberculosis is a disease of the blood, inoculation is the surest way of contracting it providing the living germs of a diseased subject are permitted to get into the circulation. This, however, is easily guarded against by taking simple precautions, and it cannot be too strongly urged that no person with cracks or cuts on their hands can with safety to themselves handle cloths used by consumptives to expectorate upon or permit their sputum to come into contact with their hands. It would also be imprudent if not positively dangerous for such persons to remove the skins from diseased animals or conduct post mortem examinations. As a simple precautionary measure all persons doing such work should either wear rubber gloves or thoroughly wash their hands in an antiseptic solution both before and after engaging in their work.

The danger of contracting the disease from germs taken into the body through the food channels is very slight for the following reasons:

FIRST. The digestive organs are not particularly susceptible to the disease.

SECOND. The digestive economy of man tends to throw off all poisonous and injurious substances found in the food.

THIRD. Milk, Meat, or any other food containing tubercle bacilli are rendered innocuous by cooking, as a temperature of 160° F. destroys the vitality of the germs.

FOURTH. While it is true that there is a possibility that milk drawn from a cow having tuberculosis localized in the udder or suffering from generalized tuberculosis in the later stages of the disease may contain the dreaded germ, it should be borne in mind that probably less than five per cent. of the cows in the state of Connecticut have bovine tuberculosis, and that not more than two per cent. of this number have tuberculous udders. As there are in round numbers 150,000 cows in this state we find by computation that there are only about one hundred and fifty affected udders in the state or considerably less than an average of one in every town, and as these cows are dry not less than three months in the year, the danger, if any exists, is correspondingly lessened, so that there is no occasion for anxiety or alarm in the minds of any who like good butter and cheese or who enjoy the refreshing draught of a glass of cool milk or who appreciate the affinity that exists between strawberries, sugar and cream.

The records of thousands of post mortem examinations of cattle affected with bovine tuberculosis have established the fact that the organs of respiration are found to be diseased in about ninety per cent. of cases. This leads to the conclusion that the bronchial tubes and lungs are much more susceptible to the disease than are the digestive organs. In the stages of the disease when there is a breaking down of the tissue and the formation of pus the animal is very likely to cough and discharge the tuberculous matter, thereby contaminating the stall, the manger, its own food, the stable floor, the water tub, and in fact anything and everything where the virus may find lodgment. As soon as this discharge becomes thoroughly dried, the action of the caretaker in cleaning the manger or sweeping the floor or a current of air caused by an open door or window or by moving of hay in the

process of feeding may liberate the germs and put them in circulation about the stable, when they may easily and quickly find their way into the lungs of other cattle or of the man who feeds them.

The consumer of milk who stops drinking his favorite beverage lest he contract tuberculosis should bear in mind that the owner or herdsman in feeding or caring for his herd is very many times more likely to inhale the tubercle bacilli through his respiratory organs into that part of his system which is most susceptible, and favorable for their future development, and that his own protection and self interest will or should ever keep him alert and watchful to detect the first symptom of the dread disease and prompt him to employ a competent veterinarian to carefully examine his herd or to report the case to this department.

Litchfield and Tolland are distinctively agricultural counties and dairying is their leading industry. In these counties there is a much larger percentage of cows in proportion to population than in the rest of the state. Milk and all its products are freely used in every farmer's family. The herdsmen are closely associated with their cows in milking and caring for them. From the report of the State Board of Health of Connecticut for 1899, page 19, are gleaned the following facts for the five years from 1894 to 1898 inclusive: Average number of deaths from consumption in Litchfield and Tolland counties for five years in 10,000 population, 11.7, in the rest of the state during the same period 16.3; percentage of deaths from consumption to total mortality during said period in Litchfield and Tolland counties 7.8, in the rest of the state 9.7. From these data it can seemingly with propriety be inferred that, drinking milk and caring for cattle are both fairly healthful and safe occupations when compared with that of riding in electric or steam cars or even walking on the city sidewalks. It should also be borne in mind that the germs in circulation in those places are from fellowman and consequently much more dangerous to the person who inhales them.

There are no data by which we can determine if bovine tuberculosis is on the increase or the decrease in this state at the present time. However, if we take a period back about thirty-five years when the farmers of the state were generally engaged in buying young stock, mostly steers, from the West, and after keeping and feeding them a year or possibly two years selling them to the butcher and marketman, and compare it with the present time when dairying is the leading industry of the farmers of the state, the result would undoubtedly show a considerable increase in the prevalence of the disease. There are several reasons why this is so, among which are the following :

FIRST. As a rule cows have a more nervous temperament than steers and their vital energies are subjected to greater strain in reproduction and in the yielding of milk and they are consequently more susceptible to the disease than are the males.

SECOND. The average cow at the present time is kept to a greater age than were the steers that were slaughtered when two, three, or four years old. This gives the disease, if present in the animal's system, more time to develop into the later and advanced stages when it assumes the contagious form and endangers the health of its stable mates.

THIRD. Farmers are more frequently trading and exchanging cows with each other than formerly, and the disease is thus carried from one herd to another.

Admitting then, that farmers now keep cows where formerly they kept steers and young stock and that bovine tuberculosis prevails to a greater extent among these cows and that the per capita consumption of milk is greater today than it has ever been before, the vital statistics of our state covering a period of thirty-five years would naturally show an increase in the number of deaths by consumption if the disease had been communicated to any appreciable extent to the human race through the medium of milk or meat from tuberculous cows.

In the report of the State Board of Health of Connecticut for

1899, page 20, are found the following facts relating to the average number of deaths from consumption in this state in five year periods from 1865 to 1898 inclusive and also the percentage of deaths from consumption of total mortality in five year periods.

YEARS.	Average Death Rate per 10,000 Living— Five Year Periods.	Percentage of Total Mortality in Five Year Periods.
1865-6-7-8-9	21.5	16.2
1870-1-2-3-4	20.9	14.3
1875-6-7-8-9	23.	13.9
1880-1-2-3-4	22.1	13.1
1885-6-7-8-9	20.2	11.6
1890-1-2-3-4	18.2	9.5
1895-6-7-8	15.9	9.3

“In the first five years of this period the average annual death rate per ten thousand was 21.5, equalling an annual mortality of 1,108 or a total of 5,540. If the same death rate had continued and prevailed in the last five years of that period the mortality would have been 9,113 instead of 6,640, a difference of 2,473 or nearly 500 lives a year in the state.”

On page 17 Dr. Lindsley says, “There has been a decided lessening of mortality from consumption both in Connecticut and in the adjoining states of Massachusetts and Rhode Island, and that the improvement has been most conspicuous during the past fifteen years; dating practically from the time of the announcement by Dr. Koch of the specific germ that causes the disease.”

This information, coming from a source that makes it perfectly trustworthy, should convince anyone who is now afraid to use milk, cream, or butter, that there is no cause for alarm. This great decrease in the number of deaths from consumption is not owing to the discovery of any cure, but rather to the fact that physicians and attendants now realize the contagious nature of the disease and exercise wise precautions to prevent its spread.

It is but fair to the farmers and dairymen of this state, than whom there is no more intelligent, progressive, and honest class of

people any where, to say that they too have kept fairly abreast of the times.

The agitation and discussion of the subject of bovine tuberculosis during the past six years, coupled with the object lessons furnished by many post mortem examinations of diseased cattle in nearly all sections of the state and witnessed by hundreds of people, have resulted in awakening in the minds of the farmers such a keen interest in the subject that today they are keeping closer watch of their cows and putting into practice many precautionary measures to prevent the entrance of the disease into their herds and to check its spread promptly when once discovered.

During the year the Commissioner in his official intercourse with many farmers in every county of the state has found them without exception eager and anxious to co-operate with the department in the effort to get rid of all animals found to be diseased. Where animals have been condemned and the matter of fixing the price has been taken up the owners have been found to be very fair.

“Allow me just the same as you do others.”

“If I have the disease in my herd I want to get it out for my own protection whether I get anything or not.”

“I shall leave it to you to give me what you think is right.”

These and many other similar remarks have been so frequently heard by the commissioner that no reply of different tone is now expected.

PREVENTION.

The tubercle bacilli will retain their vitality only a very short time when exposed to the direct rays of the sun. The germs cannot retain their power to do harm for any great length of time in diffused or reflected light. This shows the importance of securing as much light in the stable as possible. Windows to admit light and whitewashed walls to reflect it would turn many a dark and unhealthy den into light, cheerful, and wholesome stables, thereby adding greatly to the comfort, pleasure, and healthful-

ness of both owner and cattle. Stables should be whitewashed every year because lime in addition to being a good reflector is a disinfectant. "Cleanliness is next to Godliness." This trite saying applies to the stable and its occupants as forcibly as to the home and the home makers. There is far more danger to the public health in filthy stables, dirty cows, and untidy milkers than in tuberculous cows.

A great majority of the stables in this state leave little to be desired in the way of improvement, still there are many that would be greatly benefitted by more windows and more whitewash. In his visits about the state the Commissioner has volunteered suggestions along these lines, to do more than this the law does not give him warrant.

The question is frequently asked if the modern way of constructing barns, covering them with matched sheathing, and stopping every crack and crevice with battens or with mortar, is not largely responsible for bovine tuberculosis. The only reply that can be made to this inquiry is, that cattle will fatten better, yield more milk, and thrive better generally in a warm barn if it is scientifically ventilated, and if intelligence and good common sense are exercised in the care of the cattle. If the dairyman who provides good warm stables for his cows and gives them an abundance of good feed and then turns them out of doors in the morning and keeps them out until "chore-time" at night in the cold and stormy weather with no shed to protect them from the bleak winter winds, should himself go out in the same apparel he wears in his own warm house, bareheaded, and with slippers on his feet, drink about three glasses of ice water, and then stand around doing nothing but "chew gum" just as he permits his cows to do, only one-sixth as long, the chances are that he would contract such a cold as would lower his vitality and make him susceptible to pneumonia or tuberculosis (consumption.)

Such treatment of cows will not of itself produce tuberculosis any more than plowing and harrowing a piece of turf ground will of itself produce a crop of corn.

If the disease germs are present in the cow any treatment or circumstance that produces a sudden shock to her vital energies and consequent lowering of her vitality will have the same effect as the cultivation of the ground if the seeds of corn are present in the soil.

The most successful dairymen are coming to realize that the same hygienic conditions that keep themselves and their families in good health apply with equal force to their cows, and they are endeavoring more and more to treat a cow as they would a lady.

DISINFECTION.

The destruction of an animal having advanced or generalized tuberculosis will prove of little avail if another animal is placed in the same stall before the stall and manger have been thoroughly cleansed and sterilized. As has been stated the tubercle bacilli retain their vitality a long time in dark and damp places. For this and other reasons which are too apparent to call for special mention here, every stall and manger which has been occupied by a tuberculous animal should be thoroughly cleansed and disinfected *at once* after the diseased animal has been removed. A thorough scalding of the stall, stanchion and manger with hot water, followed by the application of a coat of whitewash, will render them safe for the next occupant.

We cannot close this report without condensing the foregoing remarks into the following suggestions and advice to farmers and herdsmen:

Admit as much sunlight as possible into the stable.

Whitewash the walls, ceilings, and stanchions at least once every year.

Make every cow in the herd occupy the same stall every time.

Use common sense about turning cows out from a warm barn to stay out in inclement weather.

When you discover symptoms of tuberculosis in any animal in your herd promptly call a veterinarian or report the case to the commissioner and have the animal examined.

Cleanse and disinfect after removing a tuberculous animal.

At the request of the Commissioner, N. S. Mayo, M. S., D. V. S., professor of veterinary science at The Connecticut Agricultural College, Storrs, Connecticut, has kindly prepared a paper on "Tuberculosis in Cattle" which is appended to this report.

To him and to all other veterinarians and county, town, and city health officers and the many farmers and dairymen in the state with whom the Commissioner has had official relations, he owes a debt of gratitude for their co-operation, kindness, and un-failing courtesy, and this simple acknowledgment is but a feeble expression of his appreciation and thanks.

TUBERCULOSIS IN CATTLE.

The subject of tuberculosis in cattle is one that demands the careful and conservative consideration of all interested in the cattle industry. There often appears two extreme views with reference to this important question. There are some who favor dealing with this disease in the most radical manner, by destroying every animal affected with this disease, regardless of the losses that would result, and the probable failure to accomplish the result intended. The other extreme view is that the disease is of little importance, and that no measures should be taken to suppress or prevent the spread of the disease.

Neither of these extreme views seems suited to the solving of this important question. There is however a middle ground, a view that shall recognize the seriousness and importance of this disease, and that will endeavor, in a careful and conservative manner, to take up the question and deal with it as scientific investigation and practical application shall indicate the best method of controlling the disease. No radical measure can hope to deal with such an extensive subject successfully, unless it is supported by public sentiment. Any radical measure that is not supported by public sentiment is liable to cause a reaction to the other extreme, and the object to be attained, defeated by the course pursued. There are many questions relating to tuberculosis that are not settled yet, questions that the best scientific investigators of the present day do not understand, and until they are solved, and it is to be

hoped they will be in the near future, it is well to proceed cautiously in dealing with such an important question.

The following statements with reference to tuberculosis are believed to be correct in fact, so far as has been determined by the best investigators of tuberculosis up to the present time, and the opinions expressed, based on recent investigations may indicate the future progress.

CAUSE OF TUBERCULOSIS.

The cause of tuberculosis is a germ or bacterium known as the bacillus of tuberculosis. This germ was discovered and proved to be the cause of the disease by Dr. Koch in 1882. There can be no tuberculosis without the germs are present. The germs are so small that it would take 20 placed end to end, or 100 placed side by side to reach across the thickness of a sheet of paper. When an animal has tuberculosis in a well marked case, the germs of the disease are coughed up from the lungs or work up naturally, and are scattered around on the food mangers, stall, on their own skins, or in the drinking water, in fact the animal may scatter the germs of the disease wherever it goes. If the digestive system is diseased the germs may be scattered in the manure. If the udder is affected or if the cow is badly diseased, the germs may be found in the milk.

HOW HEALTHY ANIMALS CONTRACT TUBERCULOSIS.

Healthy animals contract tuberculosis, in most cases at least, by taking the germs into their systems that have been thrown off by other cattle. They may take them in with their food where they have been scattered by a diseased animal, or in the milk, when that is infected, or by inhaling them with dust into the lungs, or by feeding or drinking from contaminated places. In a few cases the disease may be hereditary, that is the calf may be born with the germs in its system. Such cases are rare and only occur when the cow's generative organs are diseased, or when the cow is generally diseased. It is also possible for the disease to be transmitted from the cow to the bull, or vice versa, when the gen-

erative organs of either animal are diseased. While the disease is frequently found in young animals, it is probable that the disease is contracted after the calf is born, either from contact with a diseased mother or some other animal. It is probable that when cattle are associated with an animal suffering from tuberculosis, that they are exposed to the disease quite frequently, that is the germs of the disease get into the animal's system without the animal contracting the disease. There is a natural power of resistance to this disease in every healthy animal and when the animal is strong and vigorous it is enabled to resist the invading germs and throw off the disease. When an animal's system is weakened and its vitality lowered from any cause the invading germs are not overcome, but gaining a foothold they set up an incurable disease. Among the common causes that tend to weaken the animal's system are a lack of sufficient nourishing food, damp, dark, or poorly ventilated stables. Filthy quarters and a lack of proper exercise, in fact anything that causes a drain on the animal's system predisposes that animal to the disease, this is the reason that cows suffer from the disease more frequently than other cattle, reproduction and giving milk tending to weaken the animal's system.

SYMPTOMS OF TUBERCULOSIS.

Tuberculosis may attack almost any part of the animal's body, and the symptoms will vary according to the organ or part diseased. The disease is most frequently found in the lungs, lymphatic glands, liver, intestines, on the lining membrane of the chest and abdominal cavities, attacking joints and in the udder. When the lungs are badly diseased the animal coughs, falls away in flesh, is "out of condition," gets weaker and unless destroyed, dies of general emaciation. If the liver and digestive system are diseased the animal is liable to attacks of frequent and severe diarrhoea, without apparent cause, from which they gradually decline. When lymphatic glands are attacked they become greatly enlarged and frequently gather and break, discharging a thick yellow pus or matter. Such abscesses are difficult to heal perma-

nently. When joints are diseased there is severe lameness with an enlargement of the joint. It is practically impossible to recognize the disease in the early stages by a physical examination, in fact cases are frequently found where the animal was extensively diseased and no symptoms were apparent to an ordinary observer. Such cases can only be detected by the tuberculin test, a test which though not infallible, is very accurate, and harmless to healthy cattle.

POST MORTEM APPEARANCES.

When an animal is examined after death that has had tuberculosis, the diseased tissue appears as lumps or nodules either in, or on the organ attacked. If these rather hard lumps are cut open they will be found to contain a yellow cheesy substance, which in many cases has turned to pus or matter, usually thick and yellow with lumps of cheesy material in it. Sometimes the disease appears as a fibrous growth in roundish bunches on the outside of an organ or part, such as the lungs, heart, liver, diaphragm or "mid-riff," or on the lining membrane of the chest or abdominal cavities. These lumps or tubercles vary in size from a pin head to a marble, and may be so thick as to completely cover the surface attacked.

TREATMENT.

There is no treatment known for the cure of tuberculosis in cattle.

PREVENTION

The best method of preventing the disease is to keep healthy cattle from coming in contact with any animal that has the disease, or in contact with infected stalls, food, feed boxes, or drinking places. If an animal has the disease or is suspicious, it should be isolated from others and the quarters thoroughly cleaned and disinfected by a 5 per cent. solution of carbolic acid in water. Aside from keeping cattle from the germs of the disease, the best method of preventing the disease is to keep the cattle healthy and vigorous. Dark, damp, filthy, and badly ventilated stables are

hot beds for the propagation of this disease, if the germs are once introduced. Sunlight is a great disinfectant, in fact the germs are killed when exposed to direct sunlight for a few hours. Plenty of fresh air is also very important to preserve the animal's health, by bringing oxygen, carrying away the waste and keeping the quarters dry. Sunlight, fresh air, dryness and cleanliness, with good food are essentials in preserving a healthy herd.

IS THE MILK OF TUBERCULOUS COWS DANGEROUS?

If the cow's udder is diseased or the cow is badly diseased in other parts of the body, the milk is liable to contain the germs, and if it does it is dangerous.

THE RELATIONS OF BOVINE TO HUMAN TUBERCULOSIS.

It was formerly supposed that human and bovine tuberculosis were identical, but recent investigations show some marked differences. The human bacilli grow more rapidly and vigorously, outside of the body than do the bovine bacilli, there are slight differences in the appearances of the two organisms. When lower animals are inoculated with a pure culture of both kinds of bacilli, it is found that the bovine bacilli are much more virulent, that is they cause a more severe and serious form of tuberculosis than do the human bacilli, in fact when cattle are inoculated with the human bacilli they usually overcome the disease and get well without treatment, while if they are inoculated with the bovine bacilli they contract a severe form of tuberculosis. Some scientists think that the differences between the bacilli indicate different varieties, while others think that the differences are due to the different kinds of animals in which the bacilli grow. This important question cannot be considered as settled at the present time.

N. S. MAYO, M. S., D. V. S.



State of Connecticut
PUBLIC DOCUMENT No. 29

ANNUAL REPORT OF THE TRUSTEES
OF THE
CONNECTICUT
AGRICULTURAL COLLEGE

AT
MANSFIELD, CONN.
(P. O. STORRS, CONN.)

*For the period embraced within the first day of December, 1899,
and November 30, 1900*

PART I

"No man is born into this world whose work is not born with him; there is always work, and tools to work withal, for those who will; and blessed are the horny hands of toil."—EMERSON.

PRINTED BY ORDER OF THE LEGISLATURE

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1901

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*To His Excellency, GEORGE E. LOUNSBURY,
Governor of the State of Connecticut :*

*I have the honor to submit herewith the Report of the Board
of Trustees of The Connecticut Agricultural College for the year
ended September 30, 1900.*

Very respectfully,

*GEORGE A. HOPSON,
Secretary of the Board of Trustees.*

REPORT OF THE PRESIDENT.

To the Trustees of The Connecticut Agricultural College:

GENTLEMEN: — The President of The Connecticut Agricultural College has the honor to transmit to the Honorable Board of Trustees his third annual report for the calendar year ending November 30, 1900. Following the President's Report you will find, respectfully submitted, reports of the different departments of the College, and the annual catalogue for the college year, 1900-1901.

The State College of Connecticut, born in the closing years of the nineteenth century, and still youthful in its development, looks forward to the dawn of the twentieth century as a point beyond which all doubt vanishes in regard to the experimental features of the Land Grant Colleges; for they have become an established fact as the cap-stone in the public school structure, whether that structure be the best means for human education in a democracy or not.

This is a professional age, and all classes are coming to the knowledge of the fact that no line of work is free from competition, and that he who competes successfully with another must put "superior intelligence into his work" from his own brain. If the laws of development are sure, then intellectuality must not only perpetuate itself, but also must reach a higher degree of development in individuals, and improve gradually the general mass; and, in the next decade, more departments of labor hitherto regarded as menial will rise to the dignity of professions by reason of the intelligence and skill behind their operations. At the foundation of every so-called profession is a well-selected library, especially adapted to the progress and

success of that profession — for example, law, theology, medicine. And through this instrumentality the operator adds to his wisdom and experience the wisdom, observation, and experience of others. So must agriculture and the mechanic arts keep in touch with all that is latest and best in thought, and in the world of invention, and raise themselves to the level of other professions in intelligence and progressive skill.

For such work the Land Grant Colleges and the college Experiment Stations are especially established and endowed. Their rapid growth and wide popularity have been phenomenal in many states, and the former enactments of Congress in relation to these schools, together with the bill now pending in the lower House, are concrete evidence of the general interest felt in this movement toward an intelligent profession in all departments of industrial activity.

The year has been marked with both progress and encouragement. At the last commencement the College sent out a class of ten young women and eight young men, the most advanced of any class yet graduated from the institution. The entering class of twenty-eight members gives evidence of better preparation than usual, and has entered upon the class work with an interest and ambition very hopeful to observe. The course has been improved by the introduction of physics, chemistry, civics, and ancient history in the freshman year. It is expected that this improvement will be appreciated both by the students and the instructors in the more advanced work of the class-room. Keeping in touch with other institutions, the subject of forestry has been added also to the curriculum, and is under the immediate charge of Mr. H. A. Ballou, instructor in botany.

CHANGES IN THE FACULTY.

With the beginning of the current college year Dr. Campbell E. Waters of Johns Hopkins University was appointed

to the Department of Chemistry and Physics, to which position he brings education and training from an institution that ranks among the first in the country in its thoroughness of training and in the spirit of its scientific research.

Professor Henry R. Monteith of Farmington, graduate of Dartmouth College, was elected to the Department of English, History, Civics, and Political Economy. His experience in the class-room and his ripe scholarship are already producing the best results, and that too at the foundation of the college work in the lower classes. Taking into consideration the preparation of students entering the college, you will at once see the importance of both experience and scholarship at the beginning.

Miss Lulu G. Lincoln, for three years in charge of the ladies' department of the College, and Mrs. Maude K. Wheeler, instructor in Domestic Science, resigning their positions in June, Mrs. Marcia G. Greenough, Ph.B., of Peacedale, R. I., graduate of the Boston University, was elected to the position of Lady Principal of Grove Cottage, and professor of Domestic Science. Mrs. Greenough is a teacher whose college training has been thorough and complete, and one who has had a wide experience in her profession, both in class work, music, and the theory and practical work of Domestic Science as related to the home life.

IMPROVEMENTS.

Several improvements have been suggested in the individual reports to which you are referred; others will naturally suggest themselves to your minds as guardians of the State's interest in the advancement and diffusion of scientific knowledge among the industrial classes. Compared with other colleges in the adornment of the college campus with roads, walks, trees, and shrubs there is room for great improvement, both in the grounds themselves and in the approaches

and entrances to the grounds. You are already acquainted with the needs of the college in the way of further equipment in buildings and other appliances for college work. I need not recount them here. The interiors of the Main Building, Grove Cottage, Old and New Dormitories, the Chemical Laboratory, the Greenhouse, and the Valentine house have been "overhauled" and put in good condition both as to sanitary relations and their preservation. The "old conference house," situated on the edge of the campus front, and procured by the College last spring, has been removed from its site, and is to be utilized as an office, storehouse, and incubating plant by the Poultry Department.

AGRICULTURAL HALL.

Agricultural Hall is a new feature in our building equipment, as to its solidity of structure. A stone and brick building sixty by forty feet, three stories high, has been erected in connection with the small building formerly used as the college creamery. This building will be devoted exclusively to Agriculture, Dairying, and Veterinary Science. It contains a creamery, equipped with modern machinery, apparatus, cold storage, and general outfit second to none in New England. Class rooms and office rooms have been arranged for; and, when in operation, will be found to add very much to our facilities for instruction, both in class work and laboratory exercises. This building was designed and built under the supervision of the master mechanic, Professor H. S. Patterson, and is an excellent example of economy in building. In connection with this feature of equipment, the college farm, enlarged in its producing capacity by the rental of the Valentine estate, has during the year furnished hay and forage crops sufficient for all the stock of the place save grain and mixed feeds.

In this College agriculture has always stood foremost among the departments, and the past year has been no exception, and it is still the policy of the institution to encourage the art of agriculture, and make the study of the subject as attractive and popular as possible to all students, especially those from the farms, though it is not to be expected that all will follow any one occupation, but rather that each shall pursue that calling for which he is best fitted. The dairy work of the College has already made itself known in this State and in other states as well. With increased facilities we may look for results the equal of those in any state college in the country.

The horticultural division of the farm has expanded its fruit culture to the extent of a ten-acre fruit orchard recently planted. An improvement greatly to be desired in this connection is a garden plot of sufficient size to produce in its season a supply of different varieties of garden truck large enough to satisfy the demands of the College. The use of separate plots, widely scattered, for this purpose, as is now the case, neither shows the work of the department to advantage as an object lesson to young farmers nor gains for the department that credit which it ought to receive.

MECHANIC ARTS.

There seems to be a growing demand for expansion in the department of mechanic arts. To those who desire instruction and practice in this branch of industry consideration is due in accordance with the acts establishing aid to the several states maintaining Land Grant Colleges. Some work has been done every year in a quiet way in this department of the College, but always and at all times at a disadvantage. The only room for woodwork is a small one used as a repair shop for the whole College, and always filled with work for repairs or improvements. Mechanical and free-hand drawing do not

develop into that finished product that the times and conditions demand. The same is true in relation to other work in the mechanic arts; there is great need of room and apparatus. To be sure, all may not become mechanical engineers, nor blacksmiths, neither will all become farmers. Provided the student obtain the education that makes him an intelligent citizen of the State, it is sufficient if the College discovers to the student that for which he is best fitted in his life work. Those who are interested and desire to know the intent and mission of the Land Grant Colleges are respectfully referred to a "Memorial Address" on Senator Morrill, delivered at New Haven in the convention of Agricultural Colleges by President G. W. Atherton of the State College of Pennsylvania, November 14, 1900. A mechanical department, however, separate from the College and situated in any other part of the State would be a distinct institution by itself, and of no advantage whatever to the Connecticut Agricultural College.

THE COLLEGE LIBRARY.

The College Library has been steadily increasing for two years past, both in its number of volumes and in its usefulness. The best books on Agriculture, Horticulture, Forestry, Science, Economics, and Literature, Mathematics and Mechanics, History and Fiction, have been carefully selected, and in accordance with advices from all departments of the College. In these modern days college libraries should contain a good working collection, held strictly to reference uses, besides those books for circulation among members of the institution. Lecture and laboratory methods of instruction require libraries equipped at their best, and so arranged as to offer the greatest facility for ready reference. Eight thousand one hundred and twenty-seven volumes constitute the present College Library, of which six hundred and seventeen were added during this year.

The present librarian, Miss Edwina M. Whitney, Ph.B., graduate of Oberlin College, appointed by you at the beginning of the current year to succeed Mrs. J. S. Palmer, née Bowen, resigned, graces the position, to which you assigned her, with dignity, ability to arrange, classify, and tabulate the material of the library; and, with her superior knowledge of books, to assist students in their search for information.

THE COLLEGE OFFICE.

Mr. Charles E. Myers, instructor in accounting, has been in charge of the college account books during the past year. With three distinct funds and so many departments to be accounted for, the details of the office work are not few. Mr. Myers has developed for his department a complete set of books peculiarly adapted to the accounts and funds of the College, and a system which enables the exact condition of the finances of the College to be known at all times, though this work was one year in arrears when taken up by Mr. Myers. All bills are now filed at the office, including bills for ten years past. All correspondence is carefully noted and strict attention is given to minute matters.

In conjunction with class work Mr. Myers is at work upon a system especially adapted to farm accounts, and will offer this course in the winter and spring terms of the present year, as an elective course to the Senior class. When perfected it is the intention of the author to place his system of farm accounts before the agriculturists of the State without charge, if they desire it.

STUDENT LABOR.

It is the policy of the College to employ at paid labor such students as are worthy and industrious, and who have either to work their own way or help themselves to a certain extent, so

far as there is work to be done that does not require the best skill. Compulsory labor being no longer a feature of the curriculum, better work is demanded of the student in the class-room, and a better scholarship will emanate from the State College. The State College of Connecticut seems to be the last of the colleges to abandon such labor, but no worthy student need be discouraged, if only he has the "stuff" in him, and the courage to deny himself and apply himself with assiduity to study and work. And this assistance should be tendered to those only who are worthy, industrious, and of good habits, and conduct above reproach. All departments are required to give instructive laboratory work in all subjects that pertain to industrial education, sufficient to familiarize the student with the application of his scientific theories learned in the class-room.

COLLEGE ATHLETICS.

In the education of young men and women in an industrial college a gymnasium is as necessary a part of the equipment as is a laboratory, or other equipment — that is, in the completeness of that education. Granted that there is the military drill and work for the men, yet from December to April the muster field is in no condition for drilling, to make no mention of the weather meanwhile. Besides, most of the young men come from a condition of hard muscular exertion to that of mental labor, and a certain amount of physical work is necessary to preserve the equilibrium. Some get it, others do not, and none with system and regularity.

Baseball, football, and polo, with some track work, have constituted the athletics of the college year. In their athletic contests with teams of other institutions, at home and abroad, our own teams have won their share of the honors, and have conducted themselves with a spirit of manliness worthy of

note. For muscular training and physical development a gymnasium, with well appointed baths, is an equipment whose value can hardly be estimated. As at present arranged no male student has access to a bath tub, though it be the close of the nineteenth century.

The management and instructors of the College invite all persons who are interested in the work of education, interested in any or all departments of farming, floriculture, and fruit raising, to visit the institution, inspect the work of the class-rooms and laboratories, and become acquainted with The Connecticut Agricultural College. For a more complete description of the work of the various departments you are referred to the individual reports of the several professors of the College.

Respectfully submitted,

GEORGE W. FLINT,

President.

REPORT OF THE DEPARTMENT OF AGRICULTURE.

President G. W. Flint:

SIR: — The general plan of class-room instruction in Agriculture is the same as it has been for the past few years, except that the adoption of elective courses in the Senior year allows time for treating some subjects more thoroughly than formerly. The work has been grouped into four divisions: (1) Agronomy or Plant Production, (2) Dairying, (3) Animal Industry, (4) Rural Economics or Farm Management. As far as possible the subjects are placed in the last two years of the course. This is done with the belief that it is wise to have the students get as much training as possible in the sciences bearing on agriculture, before the special application of these sciences to the operation of the farm are taught.

So large a part of the time of the Professor of Agriculture is occupied with Station duties and the general management of the department as a whole that it has become necessary to assign much of the work of instruction to assistants. The highest efficiency in Station work cannot be expected from specialists whose class duties occupy the major part of their time or energy. The Board has evidently realized this and has provided assistants, who are fully capable of giving a portion of the instruction in Agriculture.

The work in Agronomy, or the general management and improvement of soils, and the cultivation of farm crops, has been given during the Sophomore year. The instruction in this division has been largely given by W. A. Stocking, Jr., and has been supplemented by a considerable amount of laboratory field practice in the preparation of home mixtures for various crops is given by the writer the last term of the Junior year. A thorough course in this is offered, as it is deemed very essential to all branches of agriculture.

Mr. C. L. Beach has full charge of the work in Dairying. The details of this work in the general course, and in the short course, will be outlined in his report. It will, therefore, not be enlarged upon here. The equipment of the Dairy Division has been much improved by the completion of a dairy and agricultural building. This building is being fitted with all the modern dairy appliances, and will soon be equipped for work of the highest efficiency.

The work in Animal Industry includes the principles of feeding and the calculation of rations for farm animals, the breeds of cattle, sheep, and swine, and the general management of farm livestock. Laboratory practice is given in the mixing of feeding stuffs so as to make a complete ration; and practice in weighing feeds and in feeding will be given as far as possible. At the request of this department the

trustees have recently approved of a plan to place upon the farm several representatives of the leading types of sheep. Small flocks of three types will soon be selected. These will represent one breed of the large, coarse-wooled type, one breed of typical mutton sheep, and one breed of fine-wooled sheep. This will add to our facilities in this branch of instruction.

Within the past two years I have given much time to the development of a course in Rural Economy or Farm Management. This branch of instruction has not been given the place in agricultural courses that its importance would seem to demand. The business methods of farmers are more often criticised than anything else. The course includes such topics as the history and progress of agriculture, rural law, capital, labor, farm machinery and equipment, specialties in farming, farm buildings, etc.

A study of Station reports and bulletins is made a part of the elective course in the Senior year. In view of the large amount of valuable material that the stations are putting out, it is of vast importance that the student of agriculture should familiarize himself with the work. New discoveries are being made each year and the practical operations of the farm must be modified to correspond to the results of the latest research. The assignment of topics for library reference and for discussion will familiarize the students with the best material available on different lines of experimenting.

The Poultry Division, under the management of Mr. R. W. Dallas, has made rapid growth during the past year. Instruction is given to the Sophomore class during the winter term. This includes not only lectures on the principles of poultry culture, but also laboratory practice in the running of incubators, feeding fowls, caponizing, and preparing poultry for market. We were able to supply a considerable demand for eggs for setting, and for young chicks during the past season, and the coming spring we hope to supply a greater de-

mand. One aim of the Poultry Division is to supply farmers at reasonable prices with a better class of stock than is found on most farms to-day. A building will be available during the coming season for an office and work room, with a good cellar for incubators. The brooder house should be improved by the addition of a cement floor and a brick or stone underpinning. This is essential to prevent losses from rats.

The substitution of laboratory field work for paid manual labor has made possible a much larger amount of practical instruction. An effort is being made to familiarize the students with all lines of farm work, beginning with the more simple operations of the farm, such as care and use of tools and teams, and following with the judging and scoring of livestock, the preparation of rations, and the mixing of fertilizers. As far as possible the laboratory work in any particular subject comes the same time in the course as the classroom instruction in the same subject.

During the past year the equipment for instructive labor has been increased by the purchase of a number of farm machines. Our facilities in this line are increasing year by year, and it is becoming important that a suitable building should be provided in which to store machinery and wagons. At present our equipment is scattered throughout the buildings of two separate farms, a condition that adds to the inconvenience of using it, and still more to its proper display before students and visitors. A storage house about 36 x 50 feet in surface area, with a dry basement, would furnish storage space for wagons and machinery, and could be so constructed as to provide a room where small tools could be securely stored and another where repairs could be made.

The enlargement of the farm by the lease of the Valentine estate has, for the first time in several years, made possible the production of sufficient coarse fodders for the needs of all the livestock of the College. The buildings on the leased

property provide ample space for the storage of crops, and for housing young cattle, sheep, and swine. The stables on the College farm had become too limited for the growing herd, but the new arrangement will allow space for increasing the number of milch cows, by the removal of the young stock to other quarters.

It is hoped that the equipment of the farm may be made of greater value in the future than in the past for experimental purposes. The two chief uses of the farm should be for instruction and for experimenting. The first is of prime importance to the students who are here to receive its advantages, while the latter should be made of as great value as possible to the farmers of the State. Lack of means and press of other work have prevented the Station from enlarging upon its work along the lines of feeding and field experiments, but it is hoped that the conditions may be more favorable for such experiments in the near future. It is desirable also that the work of the Station should be of as great value to the students as practicable, and this can be accomplished only when as much as possible of its work is done where it is open to their inspection.

Respectfully submitted,

CHARLES S. PHELPS,

Professor of Agriculture and Vice-Director of the Station.

REPORT OF THE DAIRY DEPARTMENT.

President G. W. Flint:

SIR:—I take pleasure in making the following report of the Dairy Department. You are familiar with the plans for the equipment of our new dairy building; but others who may chance to read this report may be interested in a detailed description.

I had the privilege during the summer of visiting the dairy schools of Minnesota, Wisconsin, Illinois, Indiana, Michigan, New York, and Guelph, Ontario. From ideas thus gained plans for the arrangement and equipment of our own building have resulted, which, when carried into effect, should give us facilities for instruction the equal of any of the above schools mentioned. The object aimed at in our instruction is to give the student in the class-room an understanding of the principles that underlie modern dairy practice, and to show the application of these ideas in the operation of the dairy creamery.

The character and extent of this instruction may be presented by a brief description of the equipment, with an outline of the practical work required of each student, the reason for each operation having previously been explained during the lecture hour. The equipment of the building and the plan of operation are not for the purpose of making money, but to give the largest opportunity for investigation, and to furnish the means for becoming familiar with several of the leading styles of apparatus. The practical work may be described under four heads — Creamery Practice, Private Dairy Practice, Pasteurization, and Preparation of Milk for Market and Milk Testing.

Creamery Practice. — A detail of students receives the milk as it is delivered by the patrons at the receiving room. The milk is weighed, inspected in the usual way for the detection of taint or odor, and with the Farrington tablet test, and is then aerated, cooled, and delivered to the creamery. The creamery is equipped with a receiving vat, milk pump, milk heater, two turbine and one belt power separators, two cream ripening vats, a combined churn and worker, a box churn, a Mason and a National butter worker.

A test of the speed, capacity, and skimming efficiency of each separator is made by each student. The effect of varia-

tion of temperatures in separating and change of speed and other operations are observed. Cream is ripened at different temperatures, and to different degrees of acidity, churned at various temperatures, and the effect on the quality of butter and the efficiency of churning noted. In these and other operations blank reports are supplied to help the student understand the observations he should make, and to help him with his work.

Preparation of Milk for Market. — The room for this work is equipped with a Pott's pasteurizer, a Star milk cooler, a power bottle washer, and a steam oven for sterilizing milk bottles, and other devices used in handling and preparing milk for direct consumption. The public is each year demanding greater purity and wholesomeness in its milk supply. In a few instances private dairymen have studied this problem, and by producing a high grade milk have catered to this demand. Notable examples are Mr. Gurler's dairy near Chicago, the Thorndale Dairy near Philadelphia, the Francesca Dairy near New York city, and the Nelson Dairy near Boston. Each of these dairies is milking one hundred or more cows, and is selling the milk for twelve cents a quart in the respective cities.

It is a reflection on our Experiment Stations and Agricultural Colleges generally that they are not doing more to help solve this problem of pure milk, and that the private dairymen above mentioned, and others, are the pioneers in this new field. With the College herd and dairy farm at our disposal a market milk room in which the milk produced can be handled in the best manner, and a bacteriological laboratory in which the efficiency of the precautions used at each step in the exclusion of bacteria may be tested, we have the conditions and the necessary equipment for the study and investigation of the best methods of production and preservation of market milk. Only after this study and investigation

has taken place in a thorough and systematic way, can one give instruction on this important subject on a sound and intelligent basis.

Artificial Refrigeration. — The milk room and creamery will be equipped with artificial refrigeration by means of the brine system. The four essential parts in this system are the compressor, the condenser, the expansion coils, and the circulating pump. The compressor is a pumping engine designed to compress the ammonia gas and force it through the pipes of the condenser under pressure.

The condenser is a series of pipes submerged in cold water, in which the combined effects of the pressure and the cold water reduce the gas to a liquid. The expansion coils are placed in a tank of brine, and the liquid ammonia is fed into them by means of a sensitive valve. The liquid ammonia rapidly expands into a gaseous state, and in so doing absorbs the heat from the surrounding brine, making it intensely cold; it is then circulated in pipes by means of the pump wherever cold is needed.

This brine will be used to cool milk on the Star cooler in the receiving room, to cool the milk after being heated in the pasteurizing vat, to maintain a low temperature in the storage vat in the creamery, to cool the cream in the cream vats in preparation for churning, to cool and maintain a proper temperature in the churn room, and to produce the needed cold in the refrigerators. Besides two refrigerators to be used by the dairy, there will be one provided for the farm for dressed meat, one each for the Horticultural and Poultry departments.

Farm Dairy Room. — This room will be equipped with hand machinery such as is used in private dairies. There are five different styles of hand separators for comparison, and with each will be provided a churn, cream ripening vat, butter worker, and Babcock test. In the use of this equipment to

each of a number of students will be given an equal quantity of mixed milk; and, in competition, they will be asked to separate the milk, ripen and churn the cream, salt, work, and pack the butter, make the necessary Babcock tests, make a full report of all operations, and return the resulting butter.

Milk Testing. — The milk testing laboratory will contain hand and steam Babcock testers, also desk room and appliances for determining the solids in milk, the detection of adulterations of milk, and for determining the acidity of milk and cream. Other accommodations are, on the second floor of the new building, a class-room, an office, and a bacteriological laboratory, and in the wing of the building a boiler and engine-room, with coal shed attached.

Dairy School. — Our increased facilities for instruction in dairy practice should induce more young men to take advantage of our short course dairy school. The next term of this school will open January 7, 1901, and continue twelve weeks. The students in this course spend three hours of each day in the practical work of the dairy, and two hours in lecture and class-room work on the following subjects: Feeds and Feeding, Principles of Breeding, History of Dairy Breeds, Selection of the Dairy Cow, Diseases of the Dairy Cow, with home treatment and remedies, Ventilation of Barns, Dairy Bacteriology, Dairy Bookkeeping, and Lectures on Milk and its Products.

Needs of the Department. — Our new building and equipment give excellent facilities for instruction in manufacture of milk and its products. But this is only one side of a dairy equipment. The production of a sound product to be manufactured is equally important. In the class-room emphasis is laid on the necessity for good ventilation, ample sunlight, and sanitary conditions of dairy barns; and the importance of comfortable and cleanly cow stalls, not only as a means of

insuring health to our animals, but for the highest returns from our business as well. Our practice and example should be in accordance with this teaching. During the last two years we have had tuberculosis to contend with in our dairy herd; and, during the last eighteen months, there have been five cases of abortion. Veterinarians and others may disagree as to the causes of these diseases, the method of infection, their treatment and remedy; but the great majority will agree that the best means for their eradication is in providing sanitary conditions. For the above reasons I beg leave to offer the following suggestions: The sanitary conditions of the college barn can be improved by removing the tool shed on the south side, which obstructs much of the direct sunlight; the insertion of more windows in the stable, the introduction of the "King System of Ventilation," the cementing of the manure gutters in order that they may be flushed out with water, and the introduction of some of the modern cow stalls.

Tuberculosis in the College Herd.— Since my last report there has been one reaction to the tuberculin test in the healthy herd. In April, 1900, eight animals from the reacting herd were shipped to Boston, slaughtered under government inspection, and a careful post mortem examination made. The disease was present in all the animals, but in four cases in the encysted form, showing apparently a recovery from the disease. The carcasses of all these animals passed inspection, and were sold for meat without discrimination, and netted the College about \$25 per head. We have remaining in the reacting herd three head, two of which are registered Jerseys and valuable animals. They are apparently in good health. If these animals are not a source of infection, as indicated by future tuberculin tests, it is thought best to keep them for the present at least, for the sake of their offspring. Thus far fourteen reacting animals have been disposed of at an average price of

\$22.60, and from these animals have been raised ten calves that are free from disease.

Respectfully submitted,

CHARLES L. BEACH,
Assistant Professor of Agriculture.

REPORT OF THE HORTICULTURAL DEPARTMENT.

President G. W. Flint:

SIR:— The class work of this department has varied but little the past season from recent previous years. As the work with the seniors is during the elective terms about one-third of the class selected this course, others of the young women were prevented by conflict of hours of class. The abolishment of the labor system will require very marked changes in the plans of work in the future, as at present the class gets little or no practice in the various operations of the department in connection with the class-room exercises.

This department, which is, or should be, the second, at least, in importance in the institution, has no headquarters or office on the grounds, and no room for any inside practice work. It has no place to properly prepare vegetables for use or sale or to perform many other operations which need a building. It stands very much in need of a laboratory, which would supply these wants, and in which the department of botany might be accommodated. With such a building a short winter course in horticulture could be instituted that would be of value. Lack of room prohibits such a course now.

In connection with short courses the department of horticulture could readily undertake such a course in the summer vacation. It is well supplied with bearing trees and vines, and the vegetable garden and grounds afford ample means for teaching and practice. Such a course can be arranged at present that would be more valuable than any winter course,

but perhaps not as convenient for students to attend. I would recommend advertising such a course for the coming summer, in addition to the usual summer term.

No important additions to the permanent improvement of the grounds has been made the past season. A few trees and shrubs have been planted, but most of the work done has been to care for the grounds already in shape. There is much in sight that needs putting in permanent condition, particularly in the vicinity of the cottages, that the plantings may be made. Many of the trees in the College nursery are large enough to be put in permanent location.

During the summer extensive repairs have been made on the greenhouse. The benches which have been used five years were largely replaced. The glass was also taken out and re-set. While at these repairs it was revealed that a very few years more will call for a new building, as all parts show the decay which this class of structures undergo in a short time. Aside from this a building for specimen plants is much needed, as the present house is largely used for forcing and propagation.

In accordance with plans made and reported last year the tract of land selected for a commercial orchard was prepared by the removal of most of the large surface stone, then fitted and planted last spring, so far as the trees were available. The rest, as well as all losses from last spring planting, was put in the past fall. This orchard now contains about 410 trees of the standard, winter, market apples set two rods apart, each way, for the permanent orchard. In addition about one-third is interplanted with pear, plum, peach, and other early bearing apples, making the trees one rod apart to test the ideas advocated by many growers of the feasibility of close planting at first, and removing the extra trees later. The total planting embraces over 950 trees. Aside from the ideas advanced which are being tried in this orchard, the department is also

testing others in regard to propagation that will be of interest in future years.

In compliance with requests from several sections, the department made displays of its products at four fairs, three in connection with the farm and one of fruit products alone. These exhibits in all cases attracted much attention and advertised the work of the College in those lines. The department has also furnished some fine fruit for the state exhibit at Buffalo next year, which is now in cold storage for that purpose.

The thanks of the department are due to several parties for gifts of plants and cuttings, notably Mr. H. L. Jeffrey of Woodbury, who has aided us at different times in this way. The head of the department is under obligation to the Hon. Board for permitting him to examine the work being done at other colleges the past summer. Many valuable ideas were suggested that will be of future use here.

The assistance of Mr. W. A. Warren in the operations of the department, particularly in the care and work of the greenhouse, has, as usual, been very valuable.

Respectfully submitted,

A. G. GULLEY,

Professor of Horticulture.

FARM SUPERINTENDENT'S REPORT.

President G. W. Flint:

SIR:—During the past year the work of the farm has been conducted by methods corresponding in general to those followed in former years. The most important work of the farm is that of instruction, either directly or indirectly.

With this purpose in mind, an effort has been made to have the farm serve as a laboratory for showing the conditions and

problems which may be supposed to exist on the ordinary Connecticut farm. To the students has been given an opportunity not only to see, but also to actually perform most of the various farm operations. When practicable, special pains have been taken to illustrate operations and conditions peculiar to other parts of the state, as well as those common to this immediate section. The leasing of the Valentine estate last spring greatly increased the work of the farm, but this work was done by the use of improved tools, without adding to the force of farm help.

Crops Produced. — In growing the farm crops, three main purposes have been kept in mind, namely, growing such crops as would supply to the dairy herd the coarse fodders needed; those products which could be utilized by the boarding clubs; and such other crops as would be of value as a means of instruction to the students. A large number of varieties of the various crops were grown in order to show their relative values.

Swine. — Two breeds are kept, the Berkshires and Cheshires. The former, as examples of the heavier breeds, are black, are easy keepers, and may be easily fattened at almost any age. As examples of the medium weight breeds, the Cheshires are typical. These are white, slower in maturing, and especially valuable as producers of bacon. It is hoped that before long the piggery may be enlarged sufficiently to allow the keeping of a third breed as a type of the smaller breeds.

Improvements. — Besides the regular farm work several acres of new land have been cleared and brought under cultivation during the past season. Considerable extent of permanent line fence has been built, and a number of cross fences, mostly of stone walls, have been cleared away, making larger and more easily worked fields. As the result of an ap-

appropriation made by the Trustees, the following tools and machinery have been added to the farm equipment during the year: One plain disc harrow, one Acme harrow, one Osborne spring-tooth harrow, one Osborne smoothing harrow, one Keystone weeder, one Success weeder, one Prout's horse hoe, one "M" hand plow, one National reversible sulky plow, one Clark's disc sulky plow, one Champion farm wagon, one Adriance Buckeye mower, one New Model Mudgett hay tedder, one Keystone Chief side-delivery rake, one Keystone hay loader, one Thompson's wheelbarrow grass and grain sower, one Farmer's Friend grain and fertilizer sower, and one "Wonder" potato digger. These, in addition to what the farm already possessed, make a fairly representative equipment of our modern farm tools, and give an opportunity for the students to compare the work done by them.

The knowledge gained here should serve as a guide in the purchase of tools for their own farms. The successful farmer of the future will be the man who makes his brain and his teams do the work which the man of to-day does with his hands. It is our purpose to have as complete a line of labor-saving tools as possible, and we hope to keep adding to the equipment as new and improved tools are put upon the market.

Class Work. — Three hours each week during the fall term were given to the study of the soils, farm tools, principles and methods of cultivation, care and use of manures, etc. Roberts' "Fertility of the Land" was used as the basis of this work. During the winter term the short dairy course students met four times a week in cattle feeding. Special emphasis was put upon the principles of nutrition, composition of feeds, feeding standards, value and method of making balanced rations, etc., all of these questions being treated in the most practical manner possible, by means of lectures and text-books. The Sophomore class met three hours a week during the spring term for work in crop production.

Student Labor. — Under the old system, which existed during the greater part of the year, an effort was made to familiarize each student with the actual performance of the various kinds of farm work. The work was, as far as possible, graded so that the lower class men performed the simpler operations and the upper class men the work with teams and machinery. In order to give experience in directing men, the Seniors were frequently put in charge of a few students and held responsible for the proper performance of certain pieces of work. This method proved to be very satisfactory. During the fall term of the current college year the Freshmen and Sophomores met two afternoons a week for farm laboratory work. Under the new system the same plan of grading the work is followed. To each student is given enough work to make him familiar with the operation. To each student also is given as great a variety of operations as his previous training and personal ability will permit.

The increased acreage of the farm has enabled us to produce all the crops needed for the farm and dairy herd. One of the most pressing needs now is a spacious tool and wagon house, where all the tools can be properly housed. The hay barn also should be slightly remodeled in order to adapt it to the use of the horse hay-fork, and, at the same time, to increase its storage capacity.

Respectfully submitted,

W. A. STOCKING, JR.,

Farm Superintendent.

REPORT OF THE DEPARTMENT OF BOTANY, FORESTRY, AND MILITARY SCIENCE.

President G. W. Flint:

SIR: — The work in Botany during the year just past has been along the same lines as given in the last annual report.

For the present year one important change has been made: the elementary work formerly assigned to the Freshman class has been transferred to the Sophomore class. This was done mainly because it is deemed advisable to give the time of the Freshman class to the branches of English, Physics, Chemistry, History, Civics, and Mathematics. This course will, as before, embrace the elements of Structural, Systematic, and Physiological Botany.

The course planned for the Seniors was successfully carried out in the winter and spring terms. Four students elected this course, which included lectures and laboratory work in Systematic Botany and Physiology of Plants. Practically the same work is outlined for the present Senior class as was given to the preceding one.

During the year a collection of grasses was presented to the College by Hon. T. S. Gold, Secretary of the State Board of Agriculture, and a Trustee of this College; but this, like all our other botanical collections, is not available for use, because there is, as yet, no place suitable for exhibiting it.

Military Department.—In the work of this department there have been no important changes, but some smaller ones are noticed.

Last winter three classes were instructed in class-work on the "Infantry Drill Regulations," once each week, but as no time was assigned in the schedule of class hours, these recitations came, of necessity, at the regular drill hour. This interfered seriously with the work of the drill, and it is to be hoped it will not be necessary in the future.

In appointing the cadet officers for this year it seemed wise to appoint a cadet captain, with the plan in view of causing the cadets to feel more and more the responsibility of the appearance and conduct of the cadet company. The drill now occurs in two periods of one and one-half hours, instead of in three periods of one hour each. This change was made

to accommodate the drill to the schedule of classes, which, on account of the change regarding the manual labor of the students, is different from the schedule of previous terms.

The inspection of dormitories has occurred regularly on Saturdays, with frequent visits to the cadets' rooms to inspect the order and neatness of their apartments.

In addition to the above, the subject of Forestry has been assigned to my department, and it is intended to develop as complete a course in this popular subject as is consistent with our general curriculum. The course as now planned includes Forest Botany, Forest Influences, Distribution of Forests, Forest Planting, Forest Management, Forest Protection, Timber Physics, the Forest and Farm in Connecticut, etc.

The teaching will be done by lectures and laboratory work, which latter will be understood to include the practice in woods and nursery of all the operations involved.

In this connection I have been placed in charge of all the wood and forest land belonging to the College. One large tract which is classed as forest is really waste land; and one of the first steps in practical forestry will be the planting of this area, or portions of it, with trees. A survey is now being made by the Junior class, as a part of their regular work in surveying, which will show the boundaries and areas of the several tracts assigned to this department.

Respectfully submitted,

HENRY A. BALLOU,

Assistant Professor of Botany, Forestry, and Military Science.

REPORT OF THE VETERINARY DEPARTMENT.

President G. W. Flint:

SIR:—I have the honor to submit the following report for the period beginning December 1, 1899, and ending November 30, 1900.

Veterinary Science. — The course in Veterinary Science is planned to be as practical as possible, and intended to meet the needs of farmers and stockmen. Special attention is given to minor surgery, the treatment of wounds, hygiene, and the nursing of sick stock, and the use of domestic remedies.

Instruction is given largely by lectures and by practical demonstration upon living and dead animals. A fine model of a horse, which is dissectible, skeletons, charts, and a good collection of veterinary specimens showing healthy and diseased structures, are some of the means of illustrations. In addition to the foregoing the class dissects a horse.

Practical instruction is also given to both young men and women of the Senior class in the harnessing and the general care of horses, the college driving horses serving as means of illustration.

Physiology and Anatomy. — Instruction in Human Physiology and Anatomy is given to all members of the Sophomore class during the spring term. Instruction is given by text-books, lectures, the use of skeletons and models, and by laboratory work. This work is intended to make the student familiar with the various organs and tissues of the body, the working of these parts in health, and to teach him how to preserve them in a healthy condition. It is also made a basis for future work in Veterinary Science and Zoölogy.

Bacteriology. — In the spring term of the Senior year five hours a week are given to the study of Bacteriology, which is offered to both the young men and the young women of the Senior class, and so far all members of the class have taken this work. Instruction is given largely by actual laboratory practice, with one lecture a week. Students sterilize the glassware, make culture media, grow and study bacteria, both disease-producing and harmless. As soon as they become familiar with the common laboratory methods, they are al-

lowed to choose some special subject for bacteriological investigation, such as bacteria in milk, drinking water, dust of rooms, etc.

At present the class meets in the attic of the Chemical Laboratory in two small rooms, one at either end of the building. Each room accommodates five students only, and in actual work it is necessary for the instructor to travel back and forth constantly from one end of the building to the other to render assistance to the students. It is hoped that more suitable rooms for this work may be procured in the near future.

Other Work. — The college horse-barn in my charge contains ten horses — six belonging to the College and four belonging to professors that are boarded at the horse-barn. The College horses are used for driving purposes, and for hauling freight and express, and doing all the work on the Horticultural Department. Horses are let to employees of the College for personal use, but students are required to get an order from the President.

It has been necessary to purchase one new surrey and one top carriage to replace others worn out. The health of the College horses has been excellent, but several are advanced in years and in service, and it will be necessary to replace them in the near future.

During the college year ending in June I was chairman of the Faculty Committee on "Good Order," which investigated and reported to the faculty all cases of disorder and others where discipline was needed, with recommendations. A large amount of time and work was expended by the committee, with excellent results.

I have also responded to all requests from students for aid and advice in cases of sickness or injury, and have rendered such assistance and treatment as I was able. I have

also treated all sick and injured stock belonging to the College, and have answered, so far as I was able, many inquiries concerning ailing stock sent in by residents of the State.

I have addressed a large number of Granges, Farmers and Dairy Institutes, Fairs, etc., during the year.

Extension Department.—The work of the Extension Department having been recently placed in my charge I can report only upon the prospects for the future, which are very flattering.

The aim of the Extension Department is to bring to the many citizens of the State who have not had the advantages of a higher education, opportunities for increasing their knowledge of the farm and farm life, that shall make farming more prosperous and farm homes more pleasant by showing the opportunities that farm life offers for real enjoyment of living. There is at the present time a decided movement from the cities toward rural life, and the progress which this department is making indicates that it is appreciated by those for whom it is intended.

The Extension Department offers a systematic course of home reading in Agriculture, Horticulture, Dairying, Floriculture, and home making; and furnishes books to the readers at cost. The course extends through two winters, and when completed a certificate is given. To those who cannot take the two years' course a special course is offered in any line of Agricultural reading which the member may desire.

When a circle of ten or more completes the two years' course in reading a Traveling Library of fifty volumes is furnished for the use of such circle for one year. It is then returned to the College and again sent out to other circles. The Department also endeavors to bring the members in touch with the College, by inviting questions in any department of Agriculture or Domestic Economy, which are referred to the

heads of the different departments of the College for reply. Members are also urged to make use of the Bulletins of Agriculture, and this department assists them in obtaining bulletins upon any subject they may wish. In order to carry on the work of the Extension Department successfully, it will be necessary to employ some one to assist the manager of it in the large amount of correspondence and other work. At present Mr. D. J. Burgess, a graduate of the college, is employed by the hour, and I earnestly recommend that some definite amount of money be set apart for carrying on this important work.

Respectfully submitted,

N. S. MAYO,

Professor of Anatomy and Physiology, and Veterinary Science.

REPORT OF THE DEPARTMENT OF NATURAL SCIENCE.

President G. W. Flint:

SIR: — The work of my department during the past year has been very similar to that of former years, except that during the spring term, in the optional courses offered, members of the Senior class chose work in Economic Entomology, Historical Geology, and Ornithology. And during the summer term a more extended course in both Entomology and Ornithology was taken by the present Senior class.

No year of the past has been entirely satisfactory to me, as at its close I can always see where the work might have been improved; and it is my constant aim to make each year more efficient than the preceding, calling to my aid improved methods and facilities as fast as circumstances will permit.

One serious drawback to my work in science is the fact that I must occupy recitation rooms that are used at other hours by classes in other subjects, such as Botany, Horticulture, Mathematics, etc. To get the most out of a subject, for example, in Geology or Mineralogy, the teacher needs a room where he can have his facilities for instruction, samples of minerals and rocks, and other appliances, such as charts, models, etc., complete control of the blackboards for diagrams, tables of facts which he wishes to keep before the class, etc. All these facilities should be at hand and in sight of the class through the whole term or period during which the subject is studied by the class. When the room is used for other subjects specimens must be gotten out in a hurry after it is vacated by another class, likewise removed in haste to be out of the way of those who follow. There is a great advantage in having the specimens and other facilities for instruction in sight, although they may not be under consideration at the time, because they call to the student's mind facts and principles that were passed over the preceding week or month, and thus serve as a brief review of what has gone before, and thereby the subject may be made cumulative in a way that it cannot be when a specimen or diagram is before the class for a single hour and then stowed away again perhaps to be forgotten, for often the adage "out of sight out of mind," is thus made only too true.

Also another phase of the subject, *convenience*, adds much to the efficiency of the work. In what way these difficulties may be overcome I have shown in my paper in answer to a request of the Board of Trustees under date of May 25th of the current year.

As you are aware, up to the present year, my field of instruction included Zoölogy, Geology, Mineralogy, Entomology, Ornithology, Civil Government, and Political Economy, a

field far too broad for any one instructor to cover and do the work well. As these are days of intensive work in all subjects, times in which division of labor is carried to a high degree, the principle is coming to be employed more and more in education as in other callings in life, and teachers are being asked to give instruction in fewer subjects, not that they may have less work, but that what they do may be done better, and that they may have more time for thorough preparation for teaching. No teacher can succeed to-day by knowing simply a few of the general principles of his subjects, and these, perhaps, poorly mastered. He should be familiar with his subject in all of its details. I was glad to be relieved of Political Economy and Civil Government at the opening of the fall term; and I have no doubt that they are placed in the hands of a more efficient teacher; glad, too, because by being relieved of these, I trust I shall be able to do all the better work in teaching the good list that still remains in my department.

Besides giving instruction in the above list of subjects, I have devoted the remainder of my time most diligently to the rearranging, classifying, and labeling of the Zoölogical collections in the museum. So far as we have shelf room the collection is now in excellent order, with all the branches of the animal kingdom represented; yet much needs to be done to complete it in detail, and there is keen regret that we have not a much larger and better lighted room for museum purposes. In the near future I intend to turn my attention to reclassifying the Entomological collections, which are constantly increasing, and after that, the minerals and rocks will be rearranged in better order.

This part of our equipment should have room for constant expansion, improvement, and judicious growth; for certainly no part of an educational plant exerts a wider influence in

the education of the people, both the public and the student body, than a well appointed museum.

Very respectfully submitted,

BENJAMIN F. KOONS,

Professor of Natural Science.

REPORT OF THE DEPARTMENT OF CHEMISTRY AND PHYSICS.

President G. W. Flint:

SIR:—As this is but the beginning of my first year in charge of the Department of Chemistry and Physics, I am not in a position to review the work of previous years, but can only look forward, and state my plans for the future.

I find the Laboratory in good condition, newly painted and varnished inside, and well equipped for the work in Chemistry and Physics. The most needful improvement at present is a new furnace, or, better, hot water, or steam-heating apparatus. As pointed out in last year's report, the furnace now in use fails to furnish heat for comfort during cold weather.

The proposed schedule of work provides for a course in Chemistry running through parts of four years. The work begins in the Freshman year with a study of Remsen's Elementary Chemistry. The class has one hour of laboratory work and three hours of class work a week. A much more advanced course in general Inorganic Chemistry is given by lectures in the Sophomore year. Laboratory work in Qualitative Analysis is a part of this course. The text-book used is Stoddard's Qualitative Analysis. The Junior class takes up the study of selected portions of Remsen's Organic Chemistry.

During the first term of the Senior year a course of two lectures a week on Industrial Chemistry is given. During the winter and spring terms a course in Quantitative Analysis is offered as an elective. One lecture a week on analytical methods, and six hours of laboratory work, will be required.

The study of Agricultural Chemistry, dealing with the principal fertilizers from the chemist's point of view, was taken up in the course of Industrial Chemistry. The course in Quantitative Analysis will include some practice in the analysis of fertilizers. By an arrangement with Professor Phelps the practical application of fertilizers is dealt with in his classes.

The freshman class also studies the subject of Physics, which has heretofore been left until the Sophomore year. It was thought advisable to study this science in connection with Chemistry, which is so closely related to it in many ways. Owing to this change, it will be necessary to give the Sophomore class a course in Physics this year also, so that they may not miss it altogether. It is proposed to do this in the winter and spring terms. The text-book used is Wentworth and Hill's Text-book of Physics.

Although it is too soon to decide whether the experiment of giving two sciences in the Freshman year is successful or not, yet it must be said that many of the members of the class seem unprepared to take up such work, elementary as it is. There can be no doubt, however, that a thorough training in exactness, such as is required even in the elementary study of any science, must be of value to the student. It may be found necessary to return to the plan adopted in former years, or to make other changes in the plan of work.

Respectfully submitted,

C. E. WATERS,

Professor of Chemistry and Physics.

REPORT OF THE DEPARTMENT OF DOMESTIC
SCIENCE.

President G. W. Flint:

SIR:—I beg leave to submit the following report:

Grove Cottage.—At the beginning of the fall session nine young ladies were admitted as residents at the Cottage. Two of that number have since entered the families of members of the faculty, and their places have been filled by two recent arrivals. Comparing this number with that of last year, there is a decrease of five members; but the reason for this difference is made clear by the fact that eight young ladies were graduated last year, and this year a larger number than usual have found homes elsewhere.

Our College family is harmonious and united. A spirit of mutual good feeling and helpfulness prevails, and much earnestness is shown in the general school work. Our young ladies take great interest in their home, and are enthusiastic to contribute by their handiwork to the homelike appearance of the interior. We hope to increase our resources so that we may be able to relieve the bareness of our walls by means of suitable pictures, and to decorate by other devices various charming nooks and corners, whose beauty exists now chiefly in their possibilities. What involves sacrifice or labor on our part is, as a rule, dear to us; and I do not doubt our Cottage will seem more really a home if we help each one to make it lovely.

Our social life is enlivened by monthly receptions to the faculty and students, occasions much prized by the young people. We are at home informally Friday evenings, when the young ladies living away from the Cottage and the young gentlemen students are at liberty to call. Wednesday evening two guests are entertained at tea, and Saturday evening is devoted to the meeting of the Alethia Society, in which the young ladies find great pleasure. So, what with choir re-

hearsals, class meetings — and there seems to be a strong class sentiment — Christian Endeavor meetings, and other regular and occasional events, the weeks pass pleasantly and swiftly.

There has been no serious illness in our family. A supply of medicines is kept for use in ordinary cases of sickness, and the College telephone quickly summons a physician if anxiety is felt.

The table is provided with wholesome food, well cooked, and in abundance. We are fortunate in retaining Miss Edwards, who for several years has had charge of the dining-room service.

We are restricted by as few rules as are consistent with a well-ordered household. The girls are influenced to live up to a principle, and their honor is greatly relied upon in the working out of our domestic discipline. I am happy to say that our young ladies have proved worthy of the trust.

The housework is, with the exception of cooking, done entirely by the students. Each one has a responsibility, varying in importance and amount of labor involved, according to the ability of the student. A few pay by their industry nearly the whole expense of residence here. To such earnest girls the privileges of our institution are especially valuable, and it is my hope that when the advantages offered here become more widely realized, a larger number will come to share them.

Music. — Fourteen lessons are given each week to as many young ladies, whose musical abilities range from one to four on a scale of seven. One hour a day is required for practice, and this short time seems all that is practicable with the full course of study pursued by most of the students. One pupil takes a special course preparatory to teaching, and devotes several hours per day to the piano.

Of course the progress made is not comparable to that in

the conservatories, where music is the first and usually the only consideration, but a fair rate of advance is shown, and in a few cases faithfulness and ambition have been rewarded by rapid gain in technic and expression.

A recital is planned for each term. An opportunity is thus afforded whereby friends may enjoy the accomplishments of the young pianists, and, at the same time, the pupil may acquire ease and fluency in playing before an audience.

The National Graded Course is used with success, Lowe's Four-Hand Pieces for Teacher and Pupil furnish a text for sight-reading, Gurlitt's Scenes from Childhood, Studies by Loeschhorn, Czerny, Moscheles, and others, and various compositions, classic and modern, are introduced at proper intervals. The Synthetic method of technic is employed through the course, and theory and composition, to as great an extent as seems advisable, are taught parallel with the finger work.

Vocal Culture.—The Italian method used by Mme. Marchesi is employed. The Mazzoni Solfeggi and Marchesi Vocalises come into the course, supplemented by home and foreign composers. My experience as a solo singer and choir leader for several years enables me to offer thorough preparation for church and concert singing.

The Freshman class study sight reading one hour a week. We have begun at the rudiments of time and tune, and are hopeful that, in the spring, the class will read fairly well part music of simple construction. I must express my pleasure at the apparent good-will and earnestness with which they, as individuals and as a class, have endeavored to follow the instruction given.

Domestic Science.—It is almost too early in the course to state what has been accomplished in the line of domestic art and science. It may be better to make known our plans for what we hope to do.

A course in sewing runs through the four years of College

life. The Freshmen practice the sewing stitches, patching and darning and mending, preserving samples of their work in books designed for that purpose. The Sophomores make useful articles by hand, and are initiated into the use of the sewing machine, upon which they stitch small garments for practice. This leads to the Junior work on underwear, shirt waists, and other not complicated wearing apparel. The Senior year is devoted to dress cutting by system, fitting, making, and finishing waists and skirts.

Lectures upon Hygiene, Etiquette, General Housework, Home Economics, Emergencies, Home Nursing, Chemistry of Foods, Dietaries, Sanitation, and Marketing are given during the four years.

The pressure of other work allows only a short time for the practice of cooking, but this time we use to the best advantage possible. The course progresses systematically from the building of a fire and blacking of a stove, through simple to difficult cooking problems. Courses in cooking for the sick, in the preparation of dainties, in the choice and arrangement of menus for special occasions, in the hygienic combination of foods, are taken up in due time. It is required that each young lady shall prepare a dinner, choosing and cooking the dishes, and shall entertain as hostess a member of the faculty with other guests.

The womanly acquirements of our domestic course must prove of great advantage in the home life of our graduates. The skillful, tidy housewife, the mother, wise in preserving the health of her children, the woman of economy who saves her dressmaker's and milliner's bills, the plumber's charges, and the doctor's fees, each is a power to promote the physical, mental, and moral well being of the world.

Respectfully submitted,

MARCIA G. GREENOUGH,
Professor of Music and Domestic Art.

REPORT OF THE DEPARTMENT OF MATHEMATICS, HISTORY, AND FREE-HAND DRAWING.

President G. W. Flint:

SIR:—The subjects in which I give instruction in the State College are Mathematics, History, and Free-Hand Drawing; but the greater portion of my time is applied to the first mentioned of these.

Mathematics.—This subject is taught throughout our course, being optional during the last two terms of Senior year. Through the Preparatory year Arithmetic is studied under Mr. T. D. Knowles, through the Freshman year Algebra is given by Professor H. R. Monteith, and during the remaining years of our course Geometry, Trigonometry, and Surveying are taken under my direction, as stated below.

Plane Geometry.—Sophomore class, four hours a week, three terms. In order to facilitate the introduction of each student to this subject, it is my plan and practice to begin this course with the drawing of figures by means of drawing instruments, ruler and protractor. The first lessons here as elsewhere are hardest. It is essential that these be thoroughly mastered. To secure this end the class is demonstrating in writing, in the class-room, every theorem and exercise of the first book. This method will develop capacity for original work. It is akin to the laboratory method. Those theorems which have the closest relation to subsequent studies are emphasized, but, with us, it is always held in mind that all mathematics is as valuable for the intellectual training which it gives as for its bearing on the sciences and the technical professions.

Solid Geometry.—Solid Geometry is studied three hours a week during the fall term by the Junior class. This course is the same as last year, with the addition of the Conic Sections.

Plane Trigonometry. — Plane Trigonometry follows the preceding study, three hours a week during the winter term. Because of the system of excusing from examination for meritorious term standing, it was my pleasure to offer to those whose work was not satisfactory an opportunity to raise sufficiently their standing by solving extra triangles. The offer was generally accepted and the benefit derived was certain because the work was fully individualized, no two solving the same example and no one knowing the correct result until he had computed it for himself. As a result of this experience my plan for my next class in this subject is to assign in this way examples for solution as a part of the term work. In Trigonometry we derived the fundamental formulas by the analytic method, but greater stress is laid upon the solving of triangles than the interchanging of formulas. Our students not only learn how to solve triangles, but they become proficient by practice, acquiring a working knowledge of the logarithms of numbers and of functions.

Analytic Geometry. — This subject is being studied for the first time in our College by the Senior class, three hours a week during the fall term. It will strengthen the course in Mathematics by its bearing on Algebra and Plane Geometry, and by familiarizing the student with the graphical method of representing facts, a method used extensively in various departments of investigation, and by introducing the learner to subjects of higher surveying.

Surveying. — Surveying is now begun in the spring of the Sophomore year, and supplements the work in Plane Geometry during one term. Areas of fields are found by pacing, and the plots are drawn to scale. Leveling with the hand level, taking notes, and computing elevations complete the work of this year. This course is introductory, and so given that the student may learn step-by-step, avoiding the

perplexity caused by too many unfamiliar details, all to be grasped at once. In the fall of Junior year the method of finding areas by latitudes and departures is studied and field-practice is given. During the spring and Junior year triangulating and leveling constitute the work in Surveying. A baseline and angles are measured and the sides are computed. The leveling was done over a circuit of one-half mile and was varied for each party. From this point on Surveying is optional.

Senior Mathematics.—This is an elective course in advanced surveying and engineering. It is carried through the winter and spring terms, four hours a week. For students who wish to specialize in this department, this course is intended to afford the most adequate preparation which the time will permit. Other students take it for the training which it furnishes. During the winter term the subjects for study are railroad curves, including the transition curve, computation of excavations, and higher plane surveying. The facilities for instruction have been multiplied during the past year by the addition of an engineer's transit (made by C. L. Berger & Sons, Boston), with solar attachment, a railroad wye level (made by Keuffel & Esser, N. Y.), an aneroid barometer, telemeter rods, and range poles (made in our shop), and a supply of smaller articles, such as hand-levels, tapes, and mallets. With this larger equipment the work during the spring term was more advanced and varied than before, including stadia surveying and a preliminary survey and location of a railroad line.

History.—The courses in History are being strengthened by an ampler treatment of each subject, and by the addition of new material. American History is taught in the Preparatory class, Greek and Roman History in the Freshman class, Medieval History in the Sophomore class, and optional

courses in the Senior class during the last two terms of their year. My teaching is confined to the Sophomore class, in which we consider the main forces and features of the Middle Ages. A part of the work of each member of the class is to make a special study of some topic and to report the results orally to the class and to me in writing. By this practice it is hoped that each student will learn how and where to find historical information when he needs it. Mere facts have some value, where to find the facts and how to use them is a prime object in education. A good library is necessary for the best results in teaching History. Although the number of historical volumes has been augmented during the past year by a hundred additions, there is still need of more books.

Free-Hand Drawing. — Instruction in this subject, during the fall term of Freshman year, has been given as previously, the drawings being made from plates, and as soon as a student advances sufficiently, from casts. The drawings exhibit an excellence commensurate with the time devoted to this subject.

I have outlined the work which we are doing and have done in the various studies. To command the attention of thoughtful men and to gain and retain students, it seems to me necessary that we give thorough instruction in every subject which we teach, and that we offer advanced courses to those who wish them. Whether the required work in Mathematics is not equal or superior to the standard recommended by the Committee on Courses for Agricultural Colleges (Report of the U. S. Commissioner of Education, 1896, Vol. I, p. 428) is submitted to the judgment of the reader.

In History we are approaching that standard.

Respectfully submitted,

CHARLES AUGUSTUS WHEELER,

Professor of Mathematics.

REPORT OF THE DEPARTMENT OF MECHANIC
ARTS.

President G. W. Flint:

SIR: — It is with pleasure that I present this, my sixth annual report of the Mechanical Department of The Connecticut Agricultural College, and I assure you that the pleasure I feel is not unmixed with what I believe to be a pardonable pride, as I take a retrospective view of the conditions existing at the time when I assumed my duties here, and compare them with the conditions of the present.

The removal of several old tumble-down buildings that were a blot upon our grounds is a cause of congratulation, and the repair and renovation of all the others and the erection of several new ones amounts to a transformation, and calls forth many favorable comments from those who revisit our institution.

The past year has been no exception to those that have preceded in the routine of repairs and construction, and I have the satisfaction to report that the general condition of our buildings is, on the whole, better than it has been in preceding years. Paint, varnish, kalsomine, and needed repairs, with some desirable improvements, have combined to make our rooms pleasant and sanitary. I would call particular attention to the erection during the past year of the new Agricultural Hall, which puts the Department of Agriculture on a very desirable footing. The main part of this building is forty by sixty feet, three stories in height, with a one-story annex thirty by seventy feet. The first story is of rustic stonework trimmed with red brick. The second story is of red brick, with Mansard third story, which is covered with metallic shingles on the sides and a standing seam tin roof on the deck. No pains have been spared to make this building substantial in all its parts, and, although the ornate finds no place, yet

in the general design and arrangement of parts it is pleasing to the eye, and what is better, it suits the needs of those who will occupy it. The plumbing and sewerage are of the best. The building now awaits the apparatus which will be put in place under the direction of those who are to use it.

The equipment for instruction in the Department of Mechanic Arts has not been greatly enlarged during the past three years, yet I feel sure that the time spent in acquiring even a limited knowledge of the Mechanic Arts is time well spent, and will well repay those who avail themselves of the advantages offered in this department. The limited time allowed and the facilities offered are not such as make it possible for us to turn out skilled mechanics; yet we believe that every young man should know something of the rules and handicraft that in all ages and among all nations have been the visible index of their civilization. In the words of Tillotson, "That man that does not know those things which are of necessity for him to know is but an ignorant man, whatever he may know besides."

Respectfully submitted,

H. S. PATTERSON,

Professor of Carpentry, Ironwork, and Mechanical Drawing.

REPORT OF THE DEPARTMENT OF RHETORIC, ENGLISH LITERATURE, ELOCUTION, AND ETHICS.

President G. W. Flint:

SIR: — Herewith I have the honor of presenting my fourth annual report.

A brief announcement of the courses of study and practice given under my instruction has been submitted to you in an-

other paper, and will be found in the catalogue for 1900-1901 under the following heading: Rhetoric, English Literature, Elocution, Prepared Address, Extemporaneous Speaking, and Ethics. This will indicate that the subjects intrusted to me at first still remain in my care.

In my report of last year, attention was directed to the efforts being made to develop forcible and pleasing speakers. Only one radical change has been made in the outline indicated: it has been considered advisable to discontinue the "rhetoricals" of the preparatory class, and to confine our public exhibitions to the four College classes. During the year a steadily increasing interest has been shown in all the exercises chosen for the improvement of our students in public speech.

As a rule, in their writing and speaking the two upper classes receive constant criticism and suggestion, the method of private and individual instruction being chiefly relied upon. But it is most seriously and strongly held that here, as elsewhere, any instruction must be profitless which does not prepare for independent action. Accordingly, two distinct tests are made of the actual ability of our students as they approach the end of their course.

In my last report attention was especially directed to one of these tests, the test of extemporaneous speech in public. At a chapel service before a large audience composed of fellow-students, members of the faculty, and guests, both the incentives and the embarrassments to good address are at their greatest. It is under such conditions that this test is made. And few of our Senior addresses during the past year have been received with greater attention and applause than some of those delivered extemporaneously.

The other test is provided by the Hicks prize contests for excellence in English composition and memoriter delivery.

In preparation for these contests the students are given no immediate help whatever by the instructor, each stands squarely on his own feet and endeavors to turn to the best account the instruction he has previously been given. A confidence and a dignity have thus been bred in our students which it would have been difficult or impossible to secure in any other way. Disappointing developments have been few. The contests occur as early as the second Friday in May, consequently there always is ample time before Commencement, even in the cases of Seniors, for the correction or the eradication of any faulty modes or unpleasant peculiarities of thought or speech which may show themselves. And the results in general are believed to have furnished good warrant for the continuance of this test, and, therefore, of the method of teaching upon which it is based.

During the past year the English department has been in rather closer collaboration than before with the editors of our College monthly paper, the *C. A. C. Lookout*, published by the students. On the invitation of the editor-in-chief, some of the best pieces of writing done by the Juniors and Seniors have been recommended for publication. Full credit has been given each student for the contributions, as part of the regular class requirements. New features have appeared in the paper, its volume has been enlarged, and the number of the students actively interested in its success has been multiplied. But whether or not this increased interest has acted favorably upon the *Lookout*, it certainly has added zest and reality to the study of English.

On petition of members of the class of 1900 a continuance was desired of work previously begun in English composition, extemporaneous speaking and debate. A full elective course in this was given through the spring term. Such a course, however, it will not be possible to provide regularly.

In addition to the performance of my duties here I had the honor of delivering a lecture Thursday evening, December the fourteenth, before the Farmers' Convention at Meriden, on "The English Language and Literature." This lecture will be found printed in full in the "Thirty-Third Annual Report of the Secretary of the Connecticut Board of Agriculture, 1899," pages 195 to 207.

It does not seem necessary to repeat matter presented in my previous reports. Therefore the above may be judged to indicate with sufficient fullness the later developments in my field which are of principal importance.

Respectfully submitted,

RUFUS WHITTAKER STIMSON,

Professor of Rhetoric, English Literature, Elocution, and Ethics.

REPORT OF THE DEPARTMENT OF ENGLISH, HISTORY, CIVICS, AND POLITICAL ECONOMY.

President G. W. Flint:

SIR: — The work of a recently appointed instructor may at the end of his first term be reviewed in very brief space. You will, therefore, hardly expect a very extended report from me. Perhaps it may be as well to state at the outset that the purpose has been held steadily in mind to strengthen the courses in English, History, Civics, and Economics, as much as possible, without trenching on the time required for the successful pursuit of the purely scientific studies which properly constitute the *raison d'être* of the College. At the same time it is evident that any really valuable accomplishment in these same scientific branches must require, as a condition prece-

dent, a competent knowledge of good English, as well as an ability to write and to speak clearly and forcibly. The other branches of my work are but the necessary basis of the education which is the birthright of every citizen.

Three hours of each week of the term have, without interruption, been given to the study of Political Economy with the Junior class. The work is, of course, somewhat elementary, but for that very reason, perhaps, not less satisfactory. The necessity for a more rigid training in English is fully emphasized by the experience of many of the class in this admittedly difficult subject. Otherwise there is no need of especial comment, unless it be that a more frequent and a more extended consultation of the very competent list of authorities to be found in the College Library would add greatly to the interest of the recitation, as well as to the final value of the student's work.

To the Sophomore class have been given five hours each week in English Grammar. The text used, while well adapted to the needs of advanced students, has proved somewhat difficult for this class. It has seemed to me and to the class as well, that the study of purely technical grammar should be satisfactorily completed during the Freshman year. It is a generally recognized fact that the common schools of the State provide in English Grammar a preparation that leaves much to be desired; the deficiency in the preparation in this very necessary branch is noted even in our Colleges; and in an institution like this, whose students have none of the advantages of classical study in their preliminary work, the absence of thorough training in English is of itself almost a complete bar to anything like a successful prosecution of the scientific study so generously provided here.

But even this deficiency, generally admitted as it is, ought not to be a sufficient reason for the anomalous spectacle of

two classes, — the Sophomore and the Freshman, — studying essentially the same lessons from the self-same book, a spectacle that it is hoped will never be repeated.

As a part of their work in English, the Sophomores have done something in the way of composition; and in this, as well as in the study of Grammar, have displayed commendable zeal. Further and more formal work is prepared for them next term in addition to the work mentioned above; each member of the class has taken part in the Sophomore Rhetoricals, preparing, rehearsing, and delivering the required declamation.

The Freshman class, entering with a widely varying standard of preparation, has, upon the whole, made excellent progress. It has seemed to me that, considering the grade of preparation demanded, the work is somewhat severe. In addition to the tasks assigned by the other instructors, they have had each week four hours in English, two hours in Civics, four hours in Algebra, and three hours in History. In addition to this sufficiently imposing program they have the usual exercises in composition and declamation. In fact the maintenance of a fair standing in the class requires a more strenuous effort than they themselves have heretofore been accustomed to make. This very effort, however, will result in a much better preparation for the scientific study of their later course; for scientific study is above all exact and rigorous in its use of words, the content of every term being precise and well ascertained. If the study of the sciences, as is the case in many of our public schools, were pursued merely, or mainly, for their value in training the mind; if Chemistry, for example, were to consist simply of the study in the laboratory of a few interesting and more or less related experiments, then the obligation of the Freshman instructor were, perhaps less rigorous; but in this institution, in which the arts of Agriculture are the subject mat-

ter of scientific investigation, the preparation for any profitable study of these arts must be more carefully made. This consideration will, in large measure, account for the somewhat exacting program prepared for the Freshman year. Judging by the result so far reached, and by the real earnestness of the class, a good measure of success is likely to attend our efforts. It could be wished, however, that the Freshman program left a little more generous margin of time for the use of the very excellent College Library.

Respectfully submitted,

H. R. MONTEITH,

Professor of English, History, Civics, and Political Economy.

REPORT OF THE DEPARTMENT OF ACCOUNTING.

President G. W. Flint:

SIR: — Unless a farmer is sentimentally inclined or wishes to have the luxury of indulging some fad, it should be his purpose so to manage his farm as to produce a revenue over and above a mere return of his expenditure of labor and currency. But how is he to know anything with regard to his income and outgo, his expenses, his profits, his losses, unless he keeps a sufficient line of accounts, based on a proper understanding of his needs and requirements, — simple, practical, and at the same time adequate to all demands?

So far as it is known accounting as applied to the farmer's operations, has received but little, if any, attention at the hands of accountants, and but little from the farmers themselves. The Agricultural Colleges have been slow to take the matter up, except in a very elementary way; lack of time in the course of study as usually arranged, an intangible hesitation to pick

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up a study about which little is technically known outside of accountants, poor handwriting and other difficulties, being no doubt responsible for the lack of attention.

It is needless to speak of the necessity of keeping accounts. Accounting, when properly employed, becomes the balance wheel of any business. None of the large advances in the volume and method of business dealings was made until accounting had pointed the way.

The great drawback to farm accounting is the general dread of the time and labor believed to be required, and the lack of legible penmanship. To a book-keeper, the first essential is the ability to write a *plain* business hand, and to make *good figures*. With these essentials at hand the first great requirement, accuracy, is in a fair way to be developed spontaneously. A person who is a good writer and who makes good figures is generally accurate. A prospective student of bookkeeping, then, should give serious attention to the matter of handwriting and figure-making, and should spend not a little of his time in an effort to improve in these directions.

The labor of keeping accounts is largely exaggerated. Given plain writing, good figures, a proper system, and a clear understanding of what is desired in the way of accounts, and there is no reason why the farmer, like any other business man, should not be able, by his accounts, to know all about the financial condition of his business.

The Connecticut Agricultural College is taking up this matter seriously; and, as the instructor in this branch of the curriculum, I desire to give an outline of what has been done, and to make a few suggestions for the future.

Heretofore the study of bookkeeping at this institution was confined to the fall and winter terms of the Junior year, about sixty hours in all being devoted to this subject. At the solicitation of the Instructor in Accounting this course was

last year increased to two hours per week for the fall, winter, and spring terms. The students taking the subject made fair progress, but fell a long way short of being able to handle farm accounts in a satisfactory manner.

If the College is to provide its young men and women with a knowledge of accounts sufficient to enable them to keep books for themselves or for some one else, more time must be devoted to the subject, so that, having been graduated, they may carry away with them more than a mere smattering of elementary principles, which is about all that can be expected of seventy-five hours of application to such a subject, as has heretofore been the case.

I would suggest that the subject be taken up in the Sophomore year, — winter and spring terms. This will enable the class to secure a knowledge of elementary principles. The subject should then be continued through the Junior year on advanced work. In the Senior year the subject of "Farm Accounting" should be offered as an elective study to consist of two hours per week of laboratory work in the winter term, and one hour per week in the spring term as a lecture period to be devoted to individual, auxiliary record-keeping, and lectures on the ethics of accounting, with particular reference to the matter from the point of view of the farmer.

As a matter of fact, if the subject could be taken up in the Freshman year, the result at the end of the Junior year would be still better, and the Senior class would be more capable of receiving benefit from the lectures.

The subject is taught by what is known as the "Office Routine and Business Practice" method, which is the method now most in use, and which seems also to be the best from a pedagogical point of view. The student is engaged as a book-keeper to keep books for a certain business, and the theory of each step fully explained is followed by the practical applica-

tion. For the schedule recommended in the College course see the Catalogue.

Respectfully submitted,

CHARLES E. MYERS,

Instructor in Accounting.

REPORT OF THE LIBRARIAN.

President G. W. Flint:

SIR: — My work as Librarian began with the opening of the present College year. My report will, therefore, cover only a little more than a month.

The Library was found in good working order. The most pressing need, as ever, is that of more room. It has been necessary to build an additional set of shelves which entirely covers one side of the already crowded reading-room. Part of the science books have been removed to these shelves, and one entire alcove is occupied by the periodical literature. Another alcove is soon to be built for the accommodation of the Agricultural and local papers. This will be a great improvement, as the library table can then be left entirely for study and writing, while the papers themselves will be more accessible and in less danger of being lost. The immediate need for shelf room in the Library proper has thus been relieved, although at the expense of space which seems necessary for those who use the reading-room.

At this date, November first, the accession book records 8,127 volumes, a gain of 617 since the last report. This does not quite equal the additions of last year, but as the time between the reports is shorter by a month the number of books is necessarily less. In a public as well as in a private Library, however, the question is not simply how *many*, but how *good*

books there are. In that respect, the additions of the past year seem to have equaled, if not excelled, those of other years. There seems to be an increasing desire to obtain for the Library that which will be of permanent value instead of what is of merely passing interest. To foster this desire and to advance steadily in the work so well begun is the hope and purpose of the present Librarian.

Respectfully submitted,

EDWINA WHITNEY,

Librarian.

REPORT OF THE BOARDING DEPARTMENT.

President G. W. Flint:

SIR: — During the past year no radical changes have been made in the Boarding Department of the College. Therefore my report of its affairs will relate chiefly to its general conduct, and to such of its details as may seem to be of greatest importance. While the conditions are not ideal, from a sanitary point of view, constant care has been exercised to make them as nearly so as has been possible, both within and without. I have regarded the enforcement of the law of cleanliness as of the highest importance, and have generally been faithfully assisted by others employed in the department.

The supplies furnished have been selected with the utmost care, and as much regard for superior quality, as good economy and our limitations in the cost of the students' board would permit. Special attention has been paid to variety, both in the purchase and in the preparation of food, though, of course, not always with complete success, when tried by the standard of the average student's home table. My conclusion is, after a year's effort, that partial failure here

is inevitable, and this conclusion is fortified by a knowledge of the experience of others in similar institutions with like conditions.

The equipment of the kitchen has been considerably improved, but still lacks in some essential respects. The location of the room for cooking, the basement of the main building being utilized for the purpose, forbids the greatest comfort of those employed, by partially excluding both sunlight and air, the two essential elements that should be free to all. My hope is that the time is not far off when these conditions will not exist.

The dining-room is more in keeping with the needs of the College, in respect of its surroundings, but already lacks capacity for the best accommodations of the students, and such of the faculty as board at the common table. I need not even suggest to you the urgent need of a commodious boarding hall, where all the interests of the department can be centered.

The care of the dining hall devolves upon Mrs. F. N. Fenn, whose experience, ability, and constant watchfulness, supplemented by the services of a faithful and efficient assistant, fully meet every requirement, and insure both health and economy.

In closing this brief report, it may not be out of place to say that while the duties of my present position may not be as arduous as those imposed in the management of the farm, they are no less constant and perplexing, and that my steady purpose to consult the good of all, it is my hope, has not been wholly fruitless.

Respectfully submitted,

L. P. CHAMBERLAIN,

Steward.

INVENTORIES.

Sept. 30, 1900.

FARM DEPARTMENT.

Machinery and tools,	\$1,515.95
1 Pair working oxen,	125.00
2 Pairs heavy farm horses,	500.00
1 Driving horse,	150.00
11 Thoroughbred cows,	1,100.00
4 Thoroughbred heifers,	240.00
4 Thoroughbred calves,	60.00
2 Thoroughbred bulls,	200.00
1 Thoroughbred yearling heifer,	25.00
13 Grade cows,	520.00
1 Grade calf,	5.00
10 Grade yearlings,	120.00
2 Thoroughbred boars,	40.00
2 Young thoroughbred boars,	20.00
5 Thoroughbred breeding sows,	125.00
10 Shoats,	60.00
100 Tons hay,	1,300.00
14 Tons swamp hay,	98.00
150 Tons corn ensilage,	375.00
100 Bushels corn,	50.00
1250 Bushels oats,	412.00
600 Bushels potatoes,	390.00
35 Barrels apples,	35.00
40 Bushels mangel-wurzels,	8.00
20 Tons bran,	325.00
5 Tons gluten,	131.25
8 Tons brewers' grain,	152.00
1 Ton linseed,	27.00
	<hr/>
	\$8,109.70

DAIRY DEPARTMENT.

Separators,	\$1,045.00
Cheese and butter-workers,	87.40
Vats,	270.75
Scales and balances,	82.18
Utensils,	60.30
Cooler and sterilizer,	23.00
Engine and boiler,	285.00
Supplies,	75.00
	<hr/>
	\$1,928.63

POULTRY DEPARTMENT.

159 Thoroughbred fowls (old stock),	\$158.50
12 Miscellaneous fowls (old stock),	9.00
256 Thoroughbred fowls (1900 stock),	405.50
173 Miscellaneous fowls (1900 stock),	96.88
13 Ducks (old stock),	30.00
10 Ducks (1900 stock),	10.75
3100 Pounds feed,	33.00
1400 Pounds oyster shells,	7.00
1 Feed cooker,	15.00
3 Cypher's incubators,	70.00
2 Brooders,	27.00
15 Brooder lamps,	18.00
4 Dozen water fountains,	5.00
Miscellaneous tools,	62.25
	<hr/>
	\$947.88

HORTICULTURAL DEPARTMENT.

Nursery stock,	\$50.00
Greenhouse stock,	185.55
Fruits and vegetables,	76.25
Tools,	420.00
	<hr/>
	\$731.80

HORSE-BARN DEPARTMENT.

Seven horses,	\$380.00
Wagons and sleighs,	577.50
Harnesses,	116.50
Miscellaneous equipment,	51.25
Feed,	573.00
	<hr/>
	\$1,698.25

BOARDING DEPARTMENT.

Equipment,	\$546.98
Supplies,	160.00
	<hr/>
	\$706.98

GROVE COTTAGE.

Equipment, boarding department,	\$192.75
Equipment, general household,	1,049.53
Equipment, domestic science, sewing, laundry,	213.98
Equipment, domestic science laboratory,	146.93
One grand piano,	500.00
Two upright pianos,	600.00
	<hr/>
	\$2,703.19

MAIN BUILDING.

Equipment, general household,	\$839.44
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JANITOR'S DEPARTMENT.

Equipment and supplies,	\$68.10
-------------------------	---------

NATURAL HISTORY DEPARTMENT.

Compound microscopes and attachments,	\$628.00
Dissecting microscopes and appliances,	157.50
Calcium light lanterns and outfit,	225.00
Miscellaneous apparatus,	105.00
Museum and miscellaneous collections,	700.00
	<hr/>
	\$1,815.50

CHEMICAL LABORATORY.

Chemical apparatus,	\$350.00
Reagent and other bottles,	100.00
Chemicals,	200.00
Physical apparatus,	1,500.00
Photographic apparatus,	175.00
Chemical balances,	200.00
Office furniture,	30.00
	<hr/>
	\$2,555.00

MATHEMATICS.

Surveying instruments,	\$822.15
Models,	25.00
Free-hand drawing,	45.10
	<hr/>
	\$892.25

BOTANY.

Equipment,	\$131.00
Miscellaneous supplies,	15.00
	<hr/>
	\$146.00

VETERINARY DEPARTMENT.

Equipment,	\$1,515.00
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BACTERIOLOGICAL DEPARTMENT.

Equipment,	\$491.05
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MECHANICAL DEPARTMENT.

Equipment, iron shop,	\$370.00
Equipment, wood shop,	535.00
Stock on hand, "repair material,"	385.61
	<hr/>
	\$1,290.61

MILITARY DEPARTMENT.

Equipment,	\$552.90
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DORMITORY EQUIPMENT.

Furniture,	\$481.15
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COLLEGE LIBRARY.

Shelving,
Books, 8,127 volumes,	\$18,000.00
Pamphlets, 1,000,	100.00
Card catalogue,	75.00
Furniture,	52.00
	<hr/>
	\$18,227.00

COLLEGE OFFICE.

Furniture and safe,	\$349.00
Supplies,	300.00
	<hr/>
	\$649.00

GENERAL EQUIPMENT.

Local telephones,	.	.	.	.	.	.	.....
Wagon scales,	.	.	.	.	.	.	\$150.00
Miscellaneous,	.	.	.	.	.	.	800.00
							<hr/>
							\$950.00

ANNUAL REPORT OF THE

TREASURER'S REPORT.

REPORT OF WILLIAM D. HOLMAN, TREASURER OF THE CONNECTICUT AGRICULTURAL COLLEGE, FOR THE FISCAL YEAR ENDED SEPTEMBER 30, 1900.

Balance of State Fund as reported by Treasurer Henry C. Miles, September 30, 1899, .	\$6,719.67	
Amount on deposit in First National Bank of Willimantic (suspended), September 30, 1899, not heretofore reported, .	1,165.61	
Correct balance of State Fund Sept. 30, 1899, .		\$7,885.28
Balance of Land Grant Fund as reported by Treasurer Henry C. Miles Sept. 30, 1899, .		14,759.34
Balance of Morrill Fund as reported by Treasurer Henry C. Miles, September 30, 1899, .	27,611.47	
Amount found to be due from State Treasurer, .	1,000.00	
Correct balance of Morrill Fund, Sept. 30, 1899, .		28,611.47
Balance of Hicks Prize Fund, as reported by Treasurer Henry C. Miles, Sept. 30, 1899, .		35.00
Total,		\$51,291.09

Disbursements. Receipts.

Cash Balance, September 30, 1899:		
Subject to check,	\$49,125.48	
Held by First Nat'l Bank of Willimantic (suspended),	1,165.61	
Held by State Treasurer,	1,000.00 —	\$51,291.09
Hicks Prize Fund,	\$50.00	60.00
Annual State Appropriation,		15,000.00
Income drawn from Endowment Fund,		7,252.89
Annual Federal Appropriation,		25,000.00
Board of Agriculture,		4.00
Doubtful Accounts collected,		1,217.01
Miscellaneous Receipts,		4,039.75

	<i>Disbursements.</i>	<i>Receipts.</i>
Students' Supplies,	\$1,577.40	\$1,564.32
Students' Laundry,	1,085.07	1,097.71
Students' Medicines,	8.05	5.15
Telephones and Telegrams,	179.81	51.79
Heat and Light,	4,129.82	1,411.93
House Rent,		799.00
Students' breakages,		87.73
Fees,		48.25
Officers' Salaries,	1,178.75	
Instructors' Salaries,	24,118.70	
Employees' Salaries,	2,441.76	
Administrative Expenses,	1,365.21	45.00
Advertising,	519.49	
Printing,— Miscellaneous,	101.73	
Traveling Expenses,	626.54	
Care of Buildings,	169.70	
Janitor's Supplies,	91.38	
Insurance,	989.25	
Pew Rentals,	400.00	
Tuning Pianos,	21.00	
Repairs to Local Telephone System,	25.48	
Board of Employees,	197.22	
Entertainment of Picnics,	36.36	3.50
Entertainment of Guests,	101.08	
Attendance at Fairs,	55.14	
Care of Grounds,	267.69	
Permanent Improvement of Grounds,	121.59	
Rental of Leased Property,	301.10	
Cartage,	177.68	
Miscellaneous Expenses,	126.02	
Military Department,	87.53	
Extension Department,	15.76	
Farm Department,	7,822.01	2,493.40
Horticultural Department,	2,161.90	416.12
Dairy Department,	2,971.01	2,630.30
Poultry Department,	844.27	630.28
Horse Barn Department,	1,718.80	1,104.43
Boarding Department,	9,443.65	7,457.81
Repairs to Buildings,	2,657.35	
Permanent Improvements to Old Buildings,	38.75	
Repair Material purchased, but not yet used,	385.61	
New Buildings,	5,678.16	
General Equipment,	2,275.63	
Repairs to General Equipment,	8.95	

		<i>Disbursements.</i>	<i>Receipts.</i>
Office Equipment,		\$294.97	
Library Equipment,		76.13	
Physical Culture Apparatus,		1.25	
Supplies for Instruction used by Classes,		1,236.36	
New Library Books,		1,448.03	
Periodicals,		139.65	
Lectures,		369.17	
Balance State Fund, Sept. 30, 1900,	\$9,722.92		
Balance Land Grant Fund, September 30, 1900,	10,762.39		
Balance Morrill Fund, September 30, 1900,	23,043.19		
Balance Hicks Prize Fund,	45 00		
	<u>\$43,573.50</u>		
Cash Balance, September 30, 1900 :			
Subject to check,	\$41,699.27		
Due from First National Bank, of Willimantic (suspended),	874.23		
Due from State Treasurer,	<u>1,000.00</u>		
		43,573.50	
		<u>\$123,711.46</u>	<u>\$123,711.46</u>

Amounts paid for salaries, not less than \$450.00 to any individual, from the "Morrill Fund" (United States Government Grant of 1890) :

George W. Flint,	\$2,500.00
Benjamin F. Koons,	2,000.00
Arthur B. Peebles,	2,000.00
Alfred G. Gulley,	2,000.00
Rufus W. Stimson,	1,700.00
Nelson S. Mayo,	1,700.00
Charles E. Myers,	1,400.00
Charles A. Wheeler,	1,300.00
Henry S. Patterson,	1,200.00
Charles L. Beach,	1,200.00
Henry A. Ballou,	1,100.00
William A. Stocking, Jr.,	1,100.00
Charles S. Phelps,	1,000.00
Thomas D. Knowles,	1,000.00
Roderick W. Dallas,	720.00
Lucretia J. Barber,	710.00
Maude K. Wheeler,	700.00

Amounts paid for salaries, not less than \$450.00 to any individual, from the "Land Grant Fund" (United States Government Grant of 1862):

William D. Holman, Treasurer,	\$525.00
Theodore S. Gold, Secretary,	400.00
Jessie S. Bowen,	650.00
Lulie G. Lincoln,	600.00
Walter A. Warren,	660.00

CHAPTER XXXV.

An Act concerning Reports of State Institutions.

Be it enacted by the Senate and House of Representatives in General Assembly convened:

SECTION 1. It shall be the duty of the officers of each institution and commission of this State, who are required by law to report to the Governor or to the General Assembly, to give, in the financial statement of receipts and expenditures contained in their respective reports, a detailed statement of the salaries paid to each and every officer and employee for the year ending with the 30th day of September next preceding.

SEC. 2. This act shall not apply to any officer or employee whose compensation is less than four hundred and fifty dollars per annum.

Approved, March 17, 1897.

HARTFORD, CONN., Dec. 19, 1900.

This certifies that we have examined the accounts of William D. Holman, Treasurer of the Connecticut Agricultural College, for the fiscal year ended September 30, 1900, compared them with the vouchers, and found them to be correct. The balance in the hands of the Treasurer at the end of the year was forty-one thousand six hundred ninety-nine dollars and twenty-seven cents (\$41,699.27).

Morrill Fund, twenty-two thousand and forty-three dollars and nineteen cents (\$22,043.19).

Land Grant Fund, ten thousand seven hundred and sixty-two dollars and thirty-nine cents (\$10,762.39).

State Fund, eight thousand eight hundred and ninety-three dollars and sixty-nine cents (\$8,893.69).

Total, forty-one thousand six hundred and ninety-nine dollars and twenty-seven cents (\$41,699.27).

(Signed)

D. WARD NORTHROP,
WALTER A. RILEY,
Auditors of Public Accounts.

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SCENE ON THE CAMPUS—LOOKING WEST

CATALOGUE
OF THE
OFFICERS AND STUDENTS
OF THE
CONNECTICUT
AGRICULTURAL COLLEGE
STORRS, CONNECTICUT

Courses of Study and General Information

Part II



1900-1901

"I speak of that learning which makes us acquainted with the boundless extent of nature and the universe, and which, even while we remain in this world, discovers to us both heaven, earth and sea." — CICERO.

Hartford Press
THE CASE, LOCKWOOD & BRAINARD COMPANY

1901

BOARD OF TRUSTEES.

His Excellency GOVERNOR GEORGE E. LOUNSBURY,
President, *ex officio*.

Hon. WM. E. SIMONDS, Vice-President.

Appointed by the Senate.

Term Expires in 1901.

William E. Simonds,	Canton,	Hartford County.
Theodore S. Gold,	West Cornwall,	Litchfield County.
Stephen O. Bowen,	Eastford,	Windham County.

Term Expires in 1903.

E. Stevens Henry,	Rockville,	Tolland County.
William D. Holman,	West Willington,	Tolland County.
George A. Hopson,	East Wallingford,	New Haven County.

Elected by the Alumni.

Term Expires in 1904.

Martin M. Frisbie,	Southington,	Hartford County.
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Elected by the Board of Agriculture.

Term Expires in 1901.

Edmund Halladay,	Suffield,	Hartford County.
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Ex Officio, Director of The Connecticut Experiment Station.

Edward H. Jenkins,	New Haven,	New Haven County.
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EXECUTIVE COMMITTEE.

WILLIAM E. SIMONDS,
GEORGE A. HOPSON,
EDMUND HALLADAY.

FARM COMMITTEE.

E. STEVENS HENRY,
EDMUND HALLADAY,
WILLIAM E. SIMONDS,
CHARLES S. PHELPS.

COMMITTEE ON HORTICULTURE.

GEORGE A. HOPSON,
MARTIN M. FRISBIE,
ALFRED G. GULLEY.

AUDITORS OF ACCOUNTS.

GEORGE A. HOPSON,
MARTIN M. FRISBIE.

SECRETARY OF THE BOARD.

GEORGE A. HOPSON.

TREASURER.

WILLIAM D. HOLMAN.

FACULTY AND INSTRUCTORS.

GEORGE W. FLINT, A.M., President,
Professor of English and Mathematics.

BENJAMIN F. KOONS, Ph.D.,
Professor of Zoölogy, Geology, and Entomology.

CHARLES S. PHELPS, B.S.,
Professor of Agricultural Science.

ALFRED G. GULLEY, M.S.,
Professor of Horticultural Science.

RUFUS W. STIMSON, M.A., B.D.,
Professor of Rhetoric, Ethics, Elocution, and English Literature.

NELSON S. MAYO, M.S., D.V.M.,
Professor of Anatomy, Physiology, and Veterinary Science.

CHARLES A. WHEELER, A.B.,
Professor of Mathematics, History, and Free-Hand Drawing.

HENRY R. MONTEITH, A.B.,
Professor of English, History, Civics, Political Economy, and Mathematics.

CAMPBELL E. WATERS, Ph.D.,
Professor of Chemistry and Physics.

HENRY S. PATTERSON (Master Mechanic),
Professor of Mechanics and Mechanical Drawing.

MARCIA G. GREENOUGH, A.B., Ph.B.,
Professor of Domestic Economy.

CHARLES L. BEACH, B.S.,
Assistant Professor of Dairying and Cattle Breeding.

HENRY A. BALLOU, B.S.,
Assistant Professor of Forestry, Botany, and Military Science.

WILLIAM A. STOCKING, JR., B.S.A.,
Farm Superintendent and Instructor in Agriculture.

RODERICK DALLAS,
Instructor in Poultry Culture.

CHARLES E. MYERS,
Instructor in Farm Accounts and Business Methods.

THOMAS D. KNOWLES,
Instructor in English, Mathematics, History, and Physical Culture.

CHARLES E. MYERS,
Secretary of the Faculty.

LUCIUS P. CHAMBERLAIN,
College Steward.

COMMITTEE ON COURSES OF STUDY.

CHARLES S. PHELPS,
RUFUS W. STIMSON,
CHARLES A. WHEELER,
HENRY R. MONTEITH,
CAMPBELL E. WATERS.

ADVISORY COMMITTEE ON DISCIPLINE.

HENRY S. PATTERSON,
HENRY R. MONTEITH,
HENRY A. BALLOU.

THE COLLEGE EXPERIMENT STATION.

(Storrs, Conn.)

OFFICERS OF THE STATION.

Station Staff.

WILBUR O. ATWATER, PH.D.,
Director.

CHARLES S. PHELPS, B.S.,
Vice-Director and Agriculturist.

ARTHUR P. BRYANT, M.S.,
Professor of Chemistry.

JOHN F. SNELL, PH.D.,
Assistant Chemist.

HARRY L. GARRIGUS, B.AGR.,
Assistant Agriculturist.

FRANK E. SINGLETON, B.S.,
Secretary.

EXECUTIVE COMMITTEE.

WILLIAM E. SIMONDS,
GEORGE A. HOPSON,
EDMUND HALLADAY.

WILLIAM D. HOLMAN,
Treasurer.

AUDITORS OF ACCOUNTS.

GEORGE A. HOPSON,
MARTIN M. FRISBIE.

CALENDAR

1900—1901

"Time wasted is existence ; used, is life."—YOUNG.

The full college year is forty-two weeks, divided into four terms of six, thirteen, twelve, and eleven weeks respectively.

FALL TERM, 1900

Monday,	September 17,	Entrance Examinations.
Tuesday,	September 18,	Fall Term begins.
Tuesday,	October 16,	Meeting of the Board of Trustees.
Friday,	November 23,	Freshman Rhetoricals.
Wednesday,	November 29,	} Thanksgiving Recess.
Sunday,	December 2,	
Friday,	December 7,	Sophomore Rhetoricals.
Friday,	December 14,	Junior Rhetoricals.
Monday,	December 17,	} Term Examinations.
Tuesday,	December 18,	
Wednesday,	December 19,	
Wednesday,	December 19,	Fall Term ends.

Winter Vacation, Thirteen Days

WINTER TERM, 1901

Wednesday,	January 2,	Entrance Examinations.
Thursday,	January 3,	Winter Term begins.
Wednesday,	February 6,	Preparatory Rhetoricals.
Wednesday,	February 13,	Freshman Rhetoricals.
Friday,	February 22,	Washington's Birthday.
Tuesday,	February 26,	Sophomore Rhetoricals.
Wednesday,	March 13,	Junior Rhetoricals.
Monday,	March 25,	} Term Examinations.
Tuesday,	March 26,	
Wednesday,	March 27,	
Wednesday,	March 27,	Winter Term ends.

Spring Vacation, Eleven Days

SPRING TERM, 1901

Monday,	April 8,	Entrance Examinations.
Tuesday,	April 9,	Spring Term begins.
Wednesday,	April 10,	Hicks Prize Essays due at 12 o'clock M.
Friday,	May 10,	Hicks Prize Speaking.
Wednesday,	May 15,	Freshman Rhetoricals.
Friday,	May 24,	Sophomore Rhetoricals.
Thursday,	May 30,	Memorial Day.
Friday,	May 31,	Junior Rhetoricals.
Friday,	June 7,	Prize Declamations.
Friday,	June 14,	President's Reception.
Sunday,	June 16,	Baccalaureate Sermon.
Monday,	June 17,	Society Banquets.
Tuesday,	June 18,	Class Day.
Tuesday,	June 18,	Senior Reception.
Wednesday,	June 19,	Meeting of the Board of Trustees
Wednesday,	June 19,	Commencement.
Wednesday,	June 19,	Commencement Address.
Wednesday,	June 19,	Meeting of the Alumni.
Wednesday,	June 19,	Alumni Reception.
Saturday,	June 22,	Entrance Examinations.

Senior Vacation, Four Days

SUMMER TERM, 1901

Monday,	June 24,	Summer Term begins.
Wednesday,	July 3,	} Fourth of July Recess.
Monday,	July 8,	
Friday,	August 2,	Summer Term ends.

Senior Vacation, Six and Six-sevenths Weeks
Summer Vacation, Twelve and Four-sevenths Weeks

FALL TERM, 1901

Saturday,	September 14,	Entrance Examinations.
Monday,	September 16,	Fall Term begins.
Tuesday,	October 1,	Inventories of all Departments.
Tuesday,	October 15,	Meeting of the Board of Trustees.
Friday,	November 1,	Reports of all Departments.
Friday,	November 15,	Freshman Rhetoricals.
Friday,	November 22,	Sophomore Rhetoricals.
Wednesday,	November 27,	} Thanksgiving Recess.
Sunday,	December 1,	

Friday,	December 13,	Junior Rhetoricals.
Monday,	December 16,	} Term Examinations.
Tuesday,	December 17,	
Wednesday,	December 18,	
• Wednesday,	December 18,	Fall Term ends.

Winter Vacation, Eighteen Days

WINTER TERM, 1902

Monday,	January 6,	Entrance Examinations.
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SPECIAL EXAMINATIONS, 1901.

Friday,	August 30,	In the Selectmen's Room, City Hall, Danbury.
Friday,	August 30,	In the Council Chamber, City Hall, Norwich.
Friday,	August 30,	At the Experiment Station, New Haven.
Saturday,	August 31,	In Room 50, Capitol, Hartford.
Saturday,	August 31,	At the College, Storrs. All at 9 A. M.

"Time is money." — B. FRANKLIN.

1900.						
APRIL.	MARCH.	FEB.	JAN.	AUG.	JULY.	JUNE.
Sun. 1 8 15 22 29	Sun. 4 11 18 25	Mon. 5 12 19 26	Tues. 2 9 16 23 30	Wed. 3 10 17 24	Thur. 4 11 18 25	Fri. 5 12 19 26
Sat. 6 13 20 27	Sat. 3 10 17 24	Sat. 2 9 16 23	Sat. 1 8 15 22	Sat. 1 8 15 22	Sat. 2 9 16 23	Sat. 3 10 17 24
1901.						
APRIL.	MARCH.	FEB.	JAN.	AUG.	JULY.	JUNE.
Sun. 7 14 21 28	Sun. 4 11 18 25	Mon. 5 12 19 26	Tues. 2 9 16 23 30	Wed. 3 10 17 24	Thur. 4 11 18 25	Fri. 5 12 19 26
Sat. 6 13 20 27	Sat. 3 10 17 24	Sat. 2 9 16 23	Sat. 1 8 15 22	Sat. 1 8 15 22	Sat. 2 9 16 23	Sat. 3 10 17 24
1902.						
APRIL.	MARCH.	FEB.	JAN.	AUG.	JULY.	JUNE.
Sun. 8 15 22 29	Sun. 5 12 19 26	Mon. 6 13 20 27	Tues. 3 10 17 24	Wed. 4 11 18 25	Thur. 5 12 19 26	Fri. 6 13 20 27
Sat. 7 14 21 28	Sat. 4 11 18 25	Sat. 3 10 17 24	Sat. 2 9 16 23	Sat. 2 9 16 23	Sat. 3 10 17 24	Sat. 4 11 18 25

GENERAL INFORMATION.

THE CONNECTICUT AGRICULTURAL COLLEGE.

In the various states which compose the Union, the colleges of "Agriculture and the Mechanic Arts" were founded by an Act of Congress, entitled "An Act donating Public Lands to the several States and Territories which may provide Colleges for the benefit of Agriculture and the Mechanic Arts."

This Act was approved July 2, 1862. Public land was donated to the amount of 30,000 acres for each Representative in the National Congress.

From this investment of about \$135,000 The Connecticut Agricultural College receives an income of five per cent. The State receiving such benefit shall establish "a College where the leading object shall be, without excluding other scientific and classical studies, and including military tactics, to teach such branches of learning as are related to *agriculture* and the *mechanic arts*, in order to promote the liberal and practical education of the industrial classes in the several pursuits and professions of life."

These so-called land-grant colleges are also furnished means of support from the general government by an Act of Congress, passed August 30, 1890, known as the "Morrill Bill," the fund of which now provides for each college \$25,000, annually. No buildings of any kind can be constructed from these funds, which are limited to "legitimate college expense," and "instruction and facilities for instruction."



CONNECTICUT COLLEGE







PRESIDENT'S HOUSE AND MAIN BUILDING -- ERECTED 1872

An Agricultural Experiment Station is connected with the College, and is under the control of the Board of Trustees. The object of the Station is to make experiments in things pertaining to agriculture, including dietaries, and is supported by the fund created by the "Hatch Act" of 1887; from this fund the State receives annually \$15,000, of which the Connecticut Experiment Station at New Haven takes \$7,500.

LOCATION.

The Connecticut Agricultural College is located in the town of Mansfield, Tolland County, on a commanding eminence six hundred feet above sea level, in a section of the State noted for its scenic beauty. The young men and women of the State who desire to obtain a good education at a minimum cost will find here a charming place, away from the disturbing influences of the larger centers, where they may gain for themselves that preparation for citizenship which the times demand of every citizen. The college station is Eagleville, on the Central Vermont Railroad, which connects at Willimantic with the New England division of the Consolidated Railroad. Communication with the College is rendered easy by the long-distance telephone, and by telegraph. And when connection is made with Willimantic by a trolley system, the location of the State College will be all that could be desired.

BUILDINGS AND EQUIPMENT.

Main Building.—All the buildings, with one exception, are wooden structures. The main building was erected in 1890, a two-story edifice with a basement, and contains a chapel, President's office, mathematical recitation room, library, and reading-room, dining-hall, and steward's rooms on the first floor. The second floor contains a recitation room for

English Literature, a Horticultural room, Museum, a room for Botany and Mechanical Drawing, and a second recitation room for English and Mathematics.

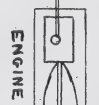
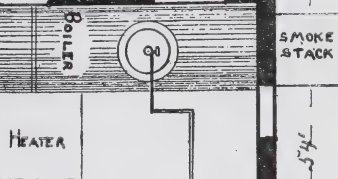
Agricultural Hall. — By skillful management and economical expenditure of the college funds the Trustees have been able, during the year, to erect a fine building sixty by forty feet and three stories high, constructed of stone and brick. The basement of this building, connected with the "creamery," will contain the dairy apparatus, laboratory, and samples of machinery. This will be the best equipped dairy laboratory in New England, and will be in readiness for the Winter Short Course of the Dairy School. The second floor will be devoted to the Veterinary Laboratory and class room, the Agricultural Laboratory and class room, and the third floor will be given to Experiment Station work. Agricultural Hall is a building that does credit to the designer and builder, Professor Henry S. Patterson, master mechanic of the College, and will be a great addition to the College buildings as well as to the department of Agriculture.

Dormitories. — The east building contains seventeen study rooms, used by the male students of the lower classes. Instructor H. A. Ballou with his family occupies six rooms on the first floor for his living apartments. The rooms are all heated by steam. The "New Dormitory" was built in 1890, with a dwelling-house for the President connected at the front. This building is steam heated, and affords a comfortable home for the upper class men.

Grove Cottage. — When co-education became established at the State College, a fine, homelike residence was constructed for the purpose. Airy rooms, spacious halls, reception parlors, dining hall, and gymnasium; a sewing room for the Domestic Science work, and rooms for the Lady Principal comprise the first and second floors. A fine laboratory room

3 2'

COAL
SHED.



STERIL
ROOM

WASH
Room.

RECEIVING
ROOM



WEIGH
SCALES

SINK

SINK

PIPE TO TANK

EXP. COIL

CHURN AND
NAT. BUTTERWORKER

BUTTER-WORKING
Room.

COMB. CHURN AND
BUTTERWORKER

BOX CHURN

BUTTER
WORKER.

CREAM

VATS

SEPARATOR
AND

VAT

SEPR.

SEPR.

BOTTLING
AND



PASTEURIZING
Room

STERIL
OVEN

BOTTLE
CLEANER

SINK

REFRIGERATORS

MILK BUTTER MEAT EGGS
TANK POULTRY VEGETABLES

PASSAGE

LAVATORY

TURBINE TESTERS

MILK TESTING
Room

TABLE FOR LACTOMETER WORK.

CREAM VATS

BARREL CHURNS AND BUTTER WORKERS.

TESTERS

SEPR.

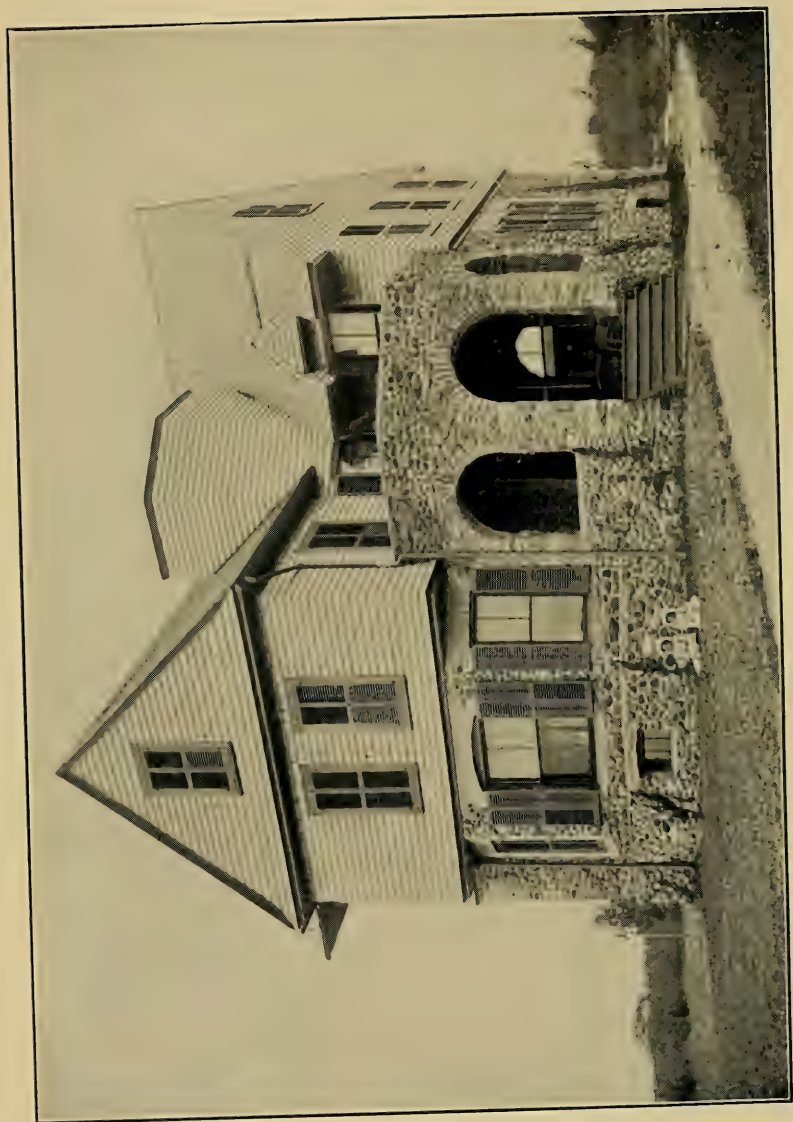
DAIRY BUILDING



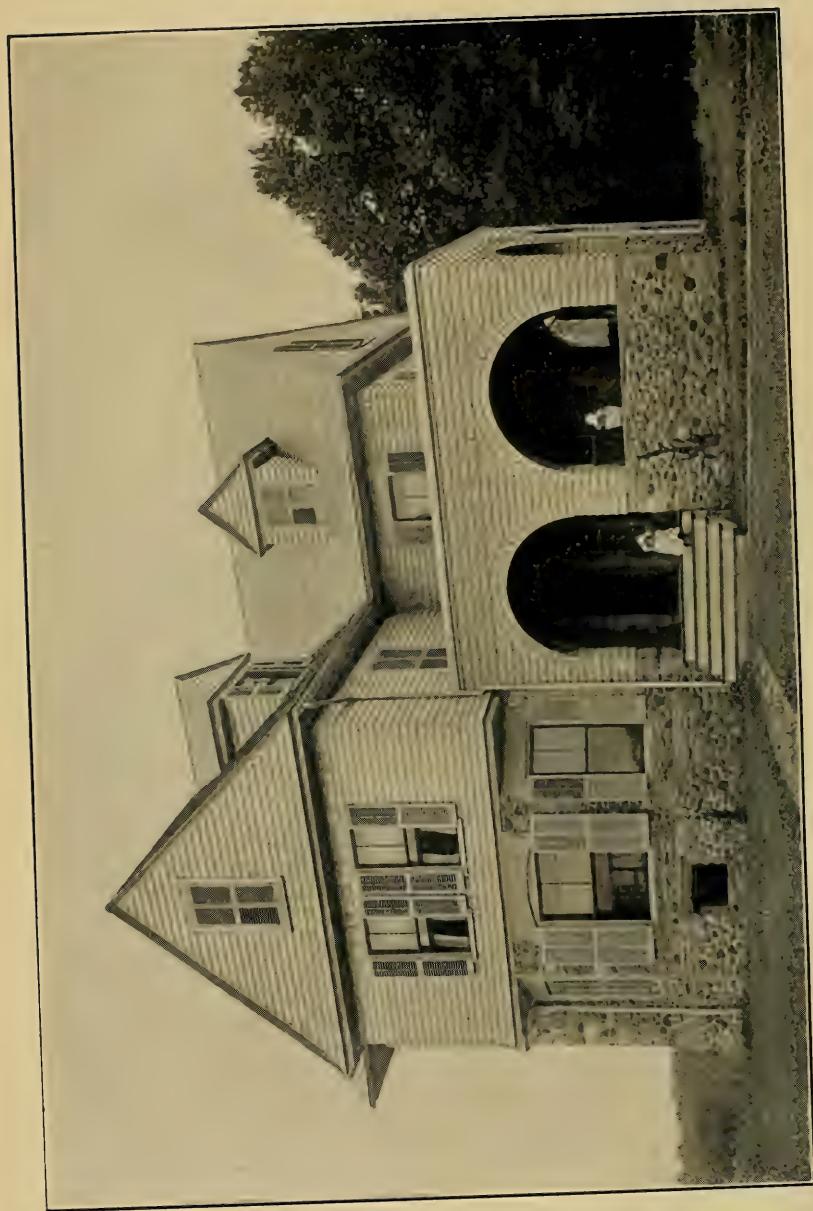
GROVE COTTAGE. PRESIDENT'S HOUSE. MAIN BUILDING. CHEMICAL LABORATORY



GROVE COTTAGE ENTRANCE HALL



COTTAGE No. 3. ERECTED 1898



COTTAGE No. 5. ERECTED 1883

has been fitted up in the basement for the Domestic Science cooking school.

Miscellaneous Buildings.—Besides those described, there are three fine dwelling houses for the professors of the College, the horse barn, and barns for the dairy herd. There is also a greenhouse for growing and storing plants.

Buildings Needed.—1. A machine shop and a carpenter shop for the "Mechanic Arts," well equipped with machinery and tools. 2. A Horticultural building with museums and laboratories; a building sufficiently large for a botanical museum and laboratory in conjunction with it. 3. Inasmuch as the government requires that military science shall be taught in the land-grant colleges, a drill hall is of paramount importance, especially during that portion of the college year when drilling on the campus is out of the question. This building could be used for an auditorium, a gymnasium, and a variety of purposes directly connected with the physical well-being of all the students. 4. A boarding hall with well-appointed kitchen above ground, apartments for the steward and his servants, and a large well-lighted dining room for both sexes. 5. A library building with modern appointments for a well-selected and well-arranged library, together with the President's offices and fire-proof vaults on the first floor, and the second floor devoted to a Museum of Art, Natural History, Mineralogy, Geology, etc.

The Valentine Estate.—This estate has been rented for a term of three years by the College, and furnishes additional land of about two hundred acres, several large barns and sheds, and a dwelling house which accommodates three families.

THE AIM AND SCOPE OF THE COLLEGE.

The Connecticut College of Agriculture and the Mechanic Arts was founded with the express design of affording to the youth of the rural communities of our Commonwealth oppor-

tunity for an education especially adapted to their needs. Such an education must be constantly and firmly directed to two ends: first, to provide such special and technical training as shall enable the young man to become a practical farmer in a scientific way; second, by means of the so-called culture studies to develop and broaden his intellectual powers, to elevate him morally and socially, and to train him for good citizenship.

Keeping in mind the aims already suggested, the College presents courses designed to give thorough, practical, and at the same time scientific training in Agriculture and the kindred arts. To this training nearly one-third of the entire course is devoted. Of the remaining two-thirds, however, more than one-half is given to the scientific study, which forms the only possible basis for sound technical training. Hence it can be seen that the College is to be classed with scientific rather than with literary institutions. Yet the great fundamental studies that form the basis of all liberal education are not neglected, and adequate provision is made for sound training in History, Literature, Ethics, Civics, Political Economy, etc., and a thorough study of these is insisted upon so far as time will permit, and the preparation and ability of the student will warrant.

EXPENSES.

The College gives free tuition and free rent of rooms.

Old and New Dormitories. — Each room contains a bed, mattress, table, washstand, bureau, and chairs. All other furniture the students will furnish for themselves. Each student will provide himself with the following necessary articles of household furnishings: 1 lamp, 1 oil can, 1 broom, 1 dust-pan, 1 wash-bowl and pitcher, 1 looking-glass, 1 slop-pail, 6 towels, 3 sheets for double bed, — these can be used on single beds; 3 pillow-cases.



GROVE COTTAGE



GROVE COTTAGE - PARLOR

Pillows, as the student may desire, and blankets or comfortables, as he may require, for his bed. It is advisable for students to bring from home rugs and carpets, etc., with which to make their rooms cheerful and homelike. The students provide themselves with kerosene oil at the village store.

The College furnishes fuel, books, and stationery at cost prices as nearly as possible, often below that figure. Board in the Boys' Hall is \$2.75 a week.

GROVE COTTAGE.

The rooms in the dormitory for the young lady students are well furnished with chairs, tables, bureaus, iron beds, mattresses, washstands, and bowls and pitchers. Each student should provide herself with the following articles: 1 lamp, 1 rocking chair, if desired; 6 towels, 3 sheets for single bed, 4 pillow-cases.

Pillows, as the student may desire, and blankets or comfortables, as she may require, for use and comfort. The price of board may vary from \$2.50 to \$2.75 per week.

Individual expenses will vary according to the tastes and desires of the student from \$125 a year upwards; but any economical student may reduce his yearly expenditures to a minimum cost.

At the beginning of each term each student who rooms in the College buildings is charged \$40 in advance to meet his College expenses. Day students, a payment in advance of \$10 for books, stationery, etc.

STUDENT LABOR.

The following regulations in regard to manual paid labor were adopted by the Board of Trustees May 25, 1900.

1. That the manual labor of male students shall be governed by the following principles:
2. Each student shall, without compensation, perform

whatever manual labor is necessary to make his instruction thorough and practical.

3. The performance of this labor shall be considered in giving the student his standing.

4. The amount, kind, and times of such manual labor shall be determined by the student's instructor, subject always to approval by the President.

5. If a student desires to perform paid manual labor, he shall be permitted to do so, *if his general conduct is good and he maintains a good stand in his studies, provided there be such labor to be performed*; and in such cases his labor shall be governed by business principles, and paid for at business rates.

6. In case a student desires to be taught any special kind of manual labor on or about a farm, he shall be so taught on making known to the President the special matters in which he desires instruction.

In all laboratory work, shop work, class work, and instructive labor, punctuality, system, and promptness are indispensable. Professors will give their classes notice daily of time and place for laboratory work and instructive labor. The daily schedule has been so revised as to give sufficient time for study and class work. The recitation period is from 8.15 A. M. to 12.10; and from 1.30 P. M. to 4.30, including afternoon laboratory exercise and instructive labor. Students who desire to work at paid labor should make application to the officers of the institution.

The care of Grove Cottage is assigned to the young women, who are paid by the hour for their work. Several of the young women find work in the families of the professors of the College, by which they earn their board.

It is the policy of the College to pay for unproductive labor according to its value to the institution, but students should

not expect to pay all of their expenses by this means, though now and then one does succeed in doing so. The College has not enough work to supply the demand, and the student's *time is needed first of all for his studies*, if he is to succeed in his college course. Those who depend for the most part upon their own earnings must expect to forego sports and leisure in which those able to pay their way may more often indulge. Students who receive aid from the College through unproductive labor must be *worthy* and *industrious*. No student whose conduct requires frequent inspection by the authorities of the College will be employed at paid labor either in term time or during vacations.

CHURCH ATTENDANCE.

All students are required to attend a short service in College Hall at 8 o'clock daily except Saturday and Sunday.

All students are required also to attend the church service on Sunday morning at 10.30 o'clock. Voluntary services are held every Tuesday evening by the Young Men's Christian Association, and every Sunday evening by the Christian Endeavor Society.

The Second Congregational Church of Storrs has assigned one-half of its seating capacity for the exclusive use of the college students.

On Sunday students are expected to conduct themselves in and about the College buildings with such decorum as befits the observance of the Sabbath.

ADMISSION TO THE FRESHMAN CLASS.

All applicants for admission to the Freshman Class of the Connecticut Agricultural College must be citizens of Connecticut, and at least fifteen years of age. Satisfactory testimonials

in respect of good character and previous scholarship from a former teacher, pastor, or neighbor, will be required of each candidate.

Candidates may enter an advanced class, if, on examination, they are found qualified.

New classes are formed at the beginning of the College year, but students may be admitted at any time by special examination.

Candidates may be admitted on certificate from accredited high schools, at the discretion of the faculty, if the previous high school work is equivalent to that done by the lower College classes.

Those who enter College under conditions will be required to make up such conditions before advancing to the next year's course of study.

All candidates for the Short Dairy Course, during the winter term, will be admitted without examination.

A good preparation enhances the College course tenfold. The following subjects will be required for entrance to the Freshman Class in 1901:

Arithmetic.—A thorough knowledge of Fractions, Denominate Numbers, Mensuration, Percentage, Discount, Interest, Bonds and Stocks, Square and Cube Root.

Geography.—What is usually required in a common school course.

History.—Montgomery's Leading Facts in American History, or its equivalent.

English.—Grammar. A knowledge of the parts of speech, the construction of sentences, punctuation, and the use of capitals, and the ability to analyze sentences, and parse the words composing them. The applicant's speech should be free from flagrant errors, and he should be able to express himself in writing with grammatical correctness and ease.

Reading.—The course prescribed by the New England colleges is recommended to all candidates for the State College.

All examinations must be written, in which the candidate's orthography will be carefully noted.

SPECIAL INSTRUCTIONS TO ENTERING CANDIDATES.

Those desiring to enter the College as new students should read carefully the College catalogue, and comply with the following instructions:

1. Write to the President for "Questions to Prospective Students."

2. When you have received it, answer the questions and mail to the President of the College.

3. When you present yourself for the entrance examination, take with you a letter of recommendation from your former teacher or pastor, certifying as to your moral character and previous scholarship. If from a high school or another college, an honorable discharge and recommendation will also be required. No examination of any candidate will be conducted until such credentials have been furnished the examiner.

4. As soon as convenient after the examination you will be notified of the result.

5. Before you leave home for College, notify the President by card on what train you will reach Eagleville, that teams may be at the station to meet you.

6. See that all pieces of your baggage are marked with your name both when you *come* to the College and when you *leave*. No baggage will be taken *from* the College unless so marked.

7. Address all inquiries about rooms to Mr. H. A. Bal-lou, Military Commandant.

8. When you arrive at the College, call at the office, deposit your money, obtain a receipt, and secure the key to your room.

9. On leaving College call at the office, pay your bills, get your receipt, and give up the key to your room.

10. Absence from College invariably interrupts the continuity of the student's work, and diverts his attention from the main object for which he attends College. Therefore, do not ask your parents or guardians for permission to leave College in term time, except for urgent reasons.

11. An excuse for leave of absence from College to be valid must be signed by the class officers and delivered to the President of the College; and the student thus excused will be required to make up all deficiencies in study and drill caused by his absence.

12. All questions of change from the regular course of study, or of dropping studies, shall be referred by the student to the committee on courses of study, and through the committee to the Faculty.

GOVERNMENT.

The Connecticut Agricultural College was founded for the purpose of providing the fullest and best opportunity for the "Industrial Classes" to secure for themselves a practical education. And all students enjoying the advantages thus afforded should realize fully that to forego these privileges by misuse or abuse is a matter of very serious concern to their future career. This institution, therefore, can offer no inducement to idle, shiftless, self-indulgent young people. Those who are too independent to yield themselves to necessary authority, or too willful to accept wise and wholesome restraint, are recommended not to enroll themselves as students of the College.

Disorder in the dormitories is always out of place. Students who fail to appreciate their *dormitory* or *dining-room* privileges will be debarred from them. Each student will be held responsible for all injury done to his room and the furniture therein.

Students under age will not be permitted to hire College teams, nor purchase anything from the departments on credit without written permission from parents or guardians, addressed to the College and left at the office.

No money will be paid to any minor for labor, or otherwise, without a written order from parent or guardian. Such orders must be addressed to The Connecticut Agricultural College, and should state specifically whether any and all money earned is to be paid, or only such part and for such a period as may be stated in the order.

Students whose accounts are in arrears will be required to "turn in" their labor account to liquidate their expenses to such an extent as may be decided in their special cases.

PROMOTION.

Instructors keep a daily record of the standing of each student, based upon a scale of one hundred. The standard for final grade in any subject is seventy per cent.

Class officers are at liberty to give tests at any time they may deem it necessary. Examinations of all classes shall be given the last week of each term.

All students shall daily maintain in their studies a standing satisfactory to their instructors. Inability or disinclination to do so will render the student liable to suspension from the class.

Students absent from one-tenth of the entire recitations in any subject shall take a special examination in such subject or subjects at the discretion of the instructor.

A failure in two branches will allow a student to pass with the condition that the deficiency be satisfactorily made up before the end of the succeeding term.

A student failing in more than two studies in any term shall drop back into the next lower class, or withdraw.

Students intending to graduate shall make up all deficiencies before the spring term of the Senior year.

No student of the Senior class whose bills are in arrears will be entitled to a diploma at graduation.

PRIZES.

Hicks Prizes. — Students of the Junior and Senior classes may contend for the Ratcliffe Hicks Prizes. Those who write for these prizes must deliver their essays, typewritten, to the President on or before the second Wednesday in April, and no essay will be received after 12 o'clock noon of that day.

Each essay shall contain at least fifteen hundred words, and shall be approved by a committee of the Faculty appointed by the President of the College.

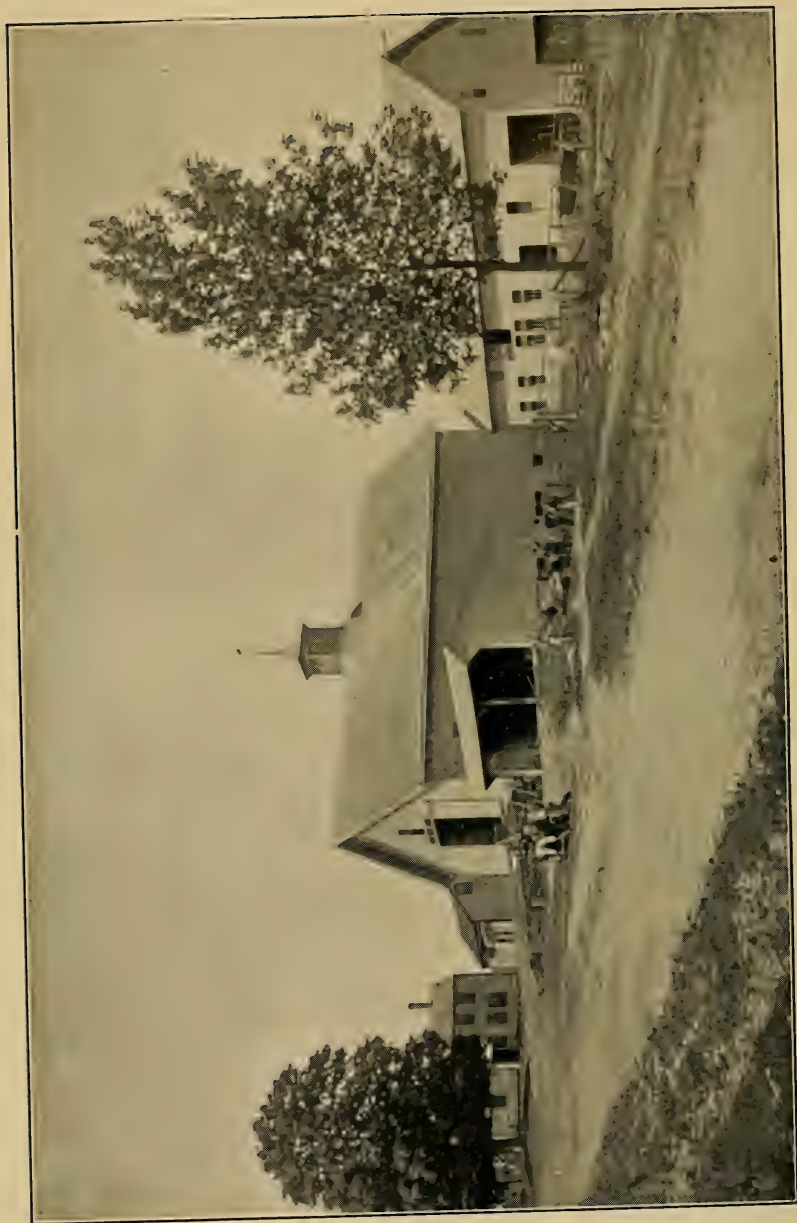
Such essays as are not approved shall be returned to the writers, and the successful contestants shall be notified at once, that they may prepare themselves to deliver their essays the second Friday evening in May from the College Hall rostrum before three judges, who shall decide on the best delivery.

The award shall be determined by the marks, both for composition and delivery.

The Ratcliffe Hicks Prizes for 1900 were awarded to Miss Gertrude Eliza Grant, first, \$30; and the second of \$20, to Mr. Frederic Joseph Baldwin.

The committee of award on English composition were Dr. Henry Davies, Storrs; Miss Mabel I. Jenkins, Normal School,

FARM BUILDINGS



Willimantic; Professor Flavel S. Luther, Trinity College, Hartford.

Committee of award on delivery, Hon. Huber Clark, Willimantic; Hon. Stephen O. Bowen, Eastford, and F. E. Wilcox, M.D., Willimantic.

Two prizes, the first of ten dollars, the second of five dollars, will be given for the best declamations delivered by the three lower classes, June 4, 1901.

COURSES OF INSTRUCTION.

The course in Agriculture may be divided into departments as follows:

1. The Farm Department, or Department of Practical Agriculture, including Agricultural Chemistry.
2. Department of Dairying and Animal Industry.
3. Department of Horticulture and Forestry, and Landscape Gardening.

A close application to the studies included in these departments together with practical work in the field and laboratory, gives to the student a basis upon which he may build his career as a successful farmer, or specialize in some of the several branches of farming industry.

The sciences bearing directly upon these departments of practical agriculture and as taught in connection with it are Botany, Chemistry, Geology, Zoölogy, Veterinary Science, Physics, Entomology, Meteorology, etc., all of which enter in, more or less, to the work of the up-to-date farmer.

To these are added the culture and mental discipline studies, such as Mathematics, English Composition, Rhetoric, History, Ethics, Political Economy, Civics, Drawing, Domestic Economy, English Literature, etc.

The development and culture derived from an earnest pursuit of these branches is intended to put the profession of agriculture on a level with other professions. Particular attention is given to improved methods in farm operations, construction of buildings, use of tools and farm machinery, and the management of stocks and crops; treatment of soils, their properties, drainage, irrigation, and fertilization.

1. *Agronomy*. — Two terms, four hours a week. Soils are treated in respect of their properties, improvement by tillage, drainage, irrigation, and fertilization. Practical instruction is given in the food value of crops, methods of planting, root structures, and development and growth, caring for, and harvesting crops.

PROFESSOR C. S. PHELPS.

2. *Zootechny*. — Four hours a week. The subject is so taught as to give the student a practical knowledge of the principles of feeding, care, and management of live stock.

PROFESSOR C. S. PHELPS.

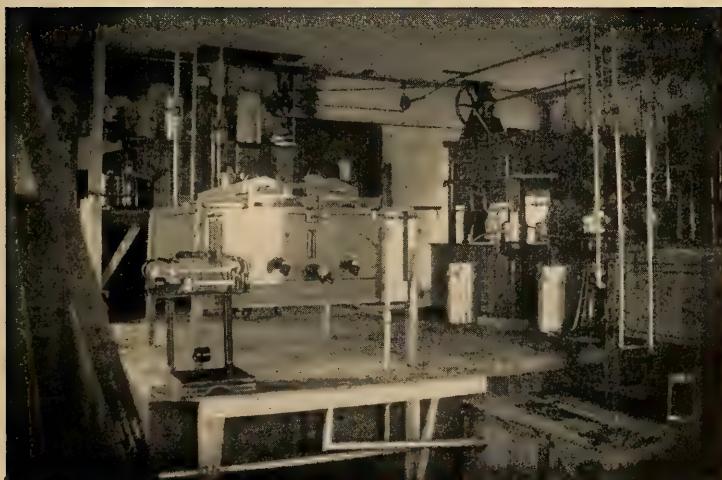
3. *Farm Economy*. — Treating of farm management, including the planting, cultivation, and rotation of crops; maintenance of the fertility of the soil, growth and nutrition of plants, mixture and application of fertilizers, harvesting, plowing, preserving of fodders, and laboratory work in field and pasture.

PROFESSOR C. S. PHELPS.

4. *Dairying*. — (a) College Course. — Winter term, Junior class, four hours a week, with laboratory work, and keeping records of the herd. Students are introduced to the practical work of one of the best, if not the best, equipped creameries in New England, in which they have actual experience in milk testing and butter making by the most ap-



"BUTTER WORKERS



INTERIOR VIEW IN CREAMERY.—PASTEURIZING VAT



STUDENTS AT WORK



BABCOCK TEST



POWER SEPARATOR



DAIRY TYPE, No. 2

Copper Queen. Record for one year: Butter, 509 lbs.; milk, 8,465 lbs.
Profit from butter, \$42.82; from milk, \$35.85

proved methods. "Milk and Its Products," and "Outlines of Dairy Bacteriology" are text-books which form the basis of class study.

ASSISTANT PROFESSOR C. L. BEACH.

5. *Dairying*. — (b) Short Course. — This course is designed for those who desire to make a special study of dairying and feel the need of a better preparation for the modern scientific methods in the art, and are not able to devote more time to it. The subjects that are treated in this course are of special interest to the young farmer: Composition of Milk, Condition of Creaming, Milking for Market, Butter Making, Salting, Packing, etc. The students have daily practice in the Creamery with Separators of various kinds, noting the varying conditions of the milk on separation, practice with the Babcock test for dairy products, with instruction how to overcome the difficulties from different conditions, and how to determine the acidity of milk and cream; also instructions in the use of the lactometer for detecting adulterations in milk. Lectures on Breeds and Breeding, Heredity, Atavism, Typical Dairy Cows, etc. Text-book used, "Milk and Its Products."

ASSISTANT PROFESSOR C. L. BEACH.

6. *Soils and Farm Machinery*. — Sophomore class, three hours a week, fall and spring terms, including farm machines and their operations, with laboratory work, and a careful study of the soil conditions necessary to the best utilization of plant food, moisture of the soil, structure and development of roots, and growth of farm crops, with lectures.

MR. W. A. STOCKING, JR.

7. *Poultry Culture*. — Winter term, selection and breeding of domestic fowls, kinds, and breeds; location and arrangement of buildings, construction and equipment; production of

eggs and meat; dressing for market; diseases and pests, together with their remedies; lectures and practice in incubation, artificial rearing, selecting the best by a scale of points; foods and feeding, and general principles of the care and management of poultry.

MR. R. DALLAS.

HORTICULTURE AND FLORICULTURE.

The right study of horticulture is designed to supplement the course in agriculture. Students graduated in agriculture should have such a knowledge of the principles of horticulture as will aid them in the adornment of the grounds of their homes, in adding to the luxuries of their tables, and be of exceeding value to them if ever they should engage in the growing of fruit or vegetables for market.

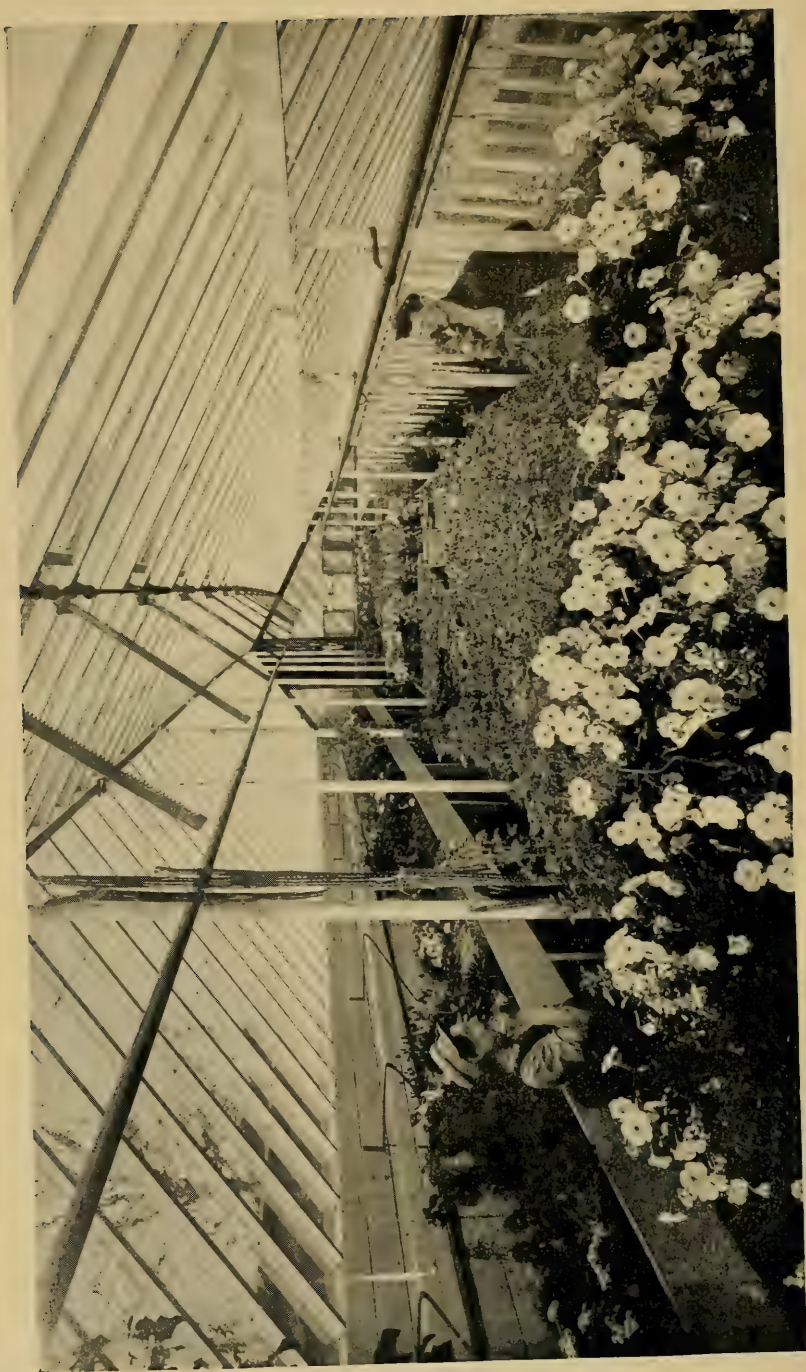
1. *Pomology*. — Ten acres on the College farm have been planted with apple, peach, and plum trees, which will afford ample facilities for observation and study in fruit culture, besides small fruits, nursery grounds, etc. Three terms, Junior year; elective, Senior year; methods of budding, grafting, pruning, and spraying are taught in a practical way.

PROFESSOR A. G. GULLEY.

2. *Market Gardening*. — The average farmer too often overlooks the value of a variety of vegetables in his own home. It is the intention of this course to emphasize this value, and show by actual test the importance to the farmer of a good vegetable garden. The student is also directed in the study of vegetables in the line of market gardening.

PROFESSOR A. G. GULLEY.

3. *Propagation of Plants*. — The College green-house affords an illustrative field for showing the multiplication of



INTERIOR OF GREENHOUSE

plants by seeds, cuttings, layers, and grafts. Also the forcing of flowers and vegetables in hot beds receives attention.

PROFESSOR A. G. GULLEY.

4. *Landscape Gardening*. — Lectures on the art of Landscape Gardening; comparison of natural and artificial methods; how to adorn home surroundings; shrubs suitable for the soil and climate of Connecticut.

PROFESSOR A. G. GULLEY.

FORESTRY.

The wholesale destruction of our forests in the states of the *forest belt* calls attention to this subject as a study in the college curriculum, that the student may be enabled to understand the significance of "*forestry for farmers*," not as a botanical study of trees, but as a crop. Value of forests, economically considered; relation of forest to climate; identification, distribution and use of trees and shrubs; forests as related to geographical distribution; forests as related to temperature and rain fall; geological history of forests; silviculture, preservation of forests, forests of the world, forests of the United States; forest planting, woods, and their uses for timber, cabinet work, building, etc.

ASSISTANT PROFESSOR H. A. BALLOU.

MECHANIC ARTS.

This department is greatly hindered by lack of rooms and equipment for practice in shop work and mechanical drawing.

1. *Carpentry*. — Winter term, Junior and Sophomore classes, three hours a week. Instruction is given in the care of tools, both grinding and filing, in making joints in wood-work, wood-turning, and the construction of useful articles.

PROFESSOR H. S. PATTERSON.

2. *Forge Work*. — Winter term, Senior class, six hours a week. Instruction with shop practice is given in making chains, chain links, eye-bolts, cold chisels, the art of welding, tempering, drawing, upsetting, filing, polishing, etc.

PROFESSOR H. S. PATTERSON.

3. *Mechanical Drawing*. — Winter term, Junior, Sophomore, and Freshman classes, two hours a week. Use of instruments is carefully taught at the beginning of the course; working drawings, tracings of machine details, problems in dimension drawing, architectural drawing, etc.

PROFESSOR H. S. PATTERSON.

DEPARTMENT OF MATHEMATICS.

The work of this department, at the present time, is progressive; but further and higher development is desired. Mechanical methods are of very little advantage to the student who intends to reach higher proficiency in the science; his real progress lies in the mastery of mathematical principles and methods; and these are attained through the carefulness, application, and the ingenuity of the learner. Very much depends upon the animus of the student in approaching this department of the College curriculum. Not only is clear thinking demanded of the student, but his thoughts should be expressed in good English, *precise and concise*; and at the very outset he should be made to recognize and master the vocabulary and language of each particular subject. To this end the solution of problems, the analysis of statement and equation must be required; *definitions must be learned in exact language*, and the demonstration of propositions in correct English should be the daily practice in the recitation. The student should be made to understand from the start that the truths of mathematics are not to be learned and then forgotten;

and he should be awakened to the fact that an earnest desire on his part is necessary to attain to the *knowledge* of the facts which are essential to the science. Too much stress cannot be laid upon thoroughness in the daily recitation, and upon frequent reviews of mathematical principles and their applications.

1. *Algebra*.—In the present College course algebra is taken up in the Freshman year, three terms, four hours a week. The subjects included in this course are the fundamental processes of algebra, equations, involution of monomials, and polynomials; evolution of the higher roots of polynomials, rules for extracting roots of numbers based on the algebraic methods; radicals, their fundamental operations, involution, evolution, rationalization, imaginary quantities, square root of binomial surds, solution of radical equations, pure and affected quadratics, simultaneous quadratic equations, proportion, progressions, binomial theorem, logarithms, etc.

PROFESSOR H. R. MONTEITH.

2. *Plane Geometry*.—The text-book used in this subject is Pettee's *Plane Geometry*. A thorough knowledge of algebra is a necessary preparation for this work. Sophomore class, three terms, four hours a week. Familiarity with the basic definitions and axioms, the theory of limits and proportion; similar figures, and the laws relating to them; propositions demonstrated in concise, geometric language; original exercises showing the application of geometric principles, practice in plotting, pace-surveying, and land leveling.

PROFESSOR C. A. WHEELER.

3. *Solid Geometry*.—Wentworth.—Students who contemplate advancing to this study need a thorough knowledge of definitions, geometric principles, and also ability to handle

the subject in advanced work. Fall term, Junior class, three hours a week. Properties of planes, diedral and polyedral angles, prisms, pyramids, cylinders, and calculation of areas by latitude and departures.

PROFESSOR C. A. WHEELER.

4. *Plane Trigonometry*. — Wentworth. — Winter term, Junior class, three hours a week. Studies preliminary to this branch of mathematics are algebra and geometry. Some of the principles investigated are definitions, functions of angles, measurement of angles, angles positive and negative, derivation and reduction of trigonometric formulæ, solution of right and oblique triangles, with care in tracing functions and accuracy in using logarithmic tables.

PROFESSOR C. A. WHEELER.

5. *Spherical Trigonometry*. — Wentworth. — Winter term, Junior class, three hours a week, succeeding plane trigonometry. This subject is of special interest to students contemplating a course in civil engineering; it includes the investigation of the spherical right triangle, and the consideration of spherical triangles in general; the deriving of formulæ and their application to the solution of examples.

PROFESSOR C. A. WHEELER.

6. *Analytic Geometry*. — Wentworth. — Fall term, Senior class, three hours a week. The student finds his way to this subject through algebra, geometry, and trigonometry; geometric lines and curves are represented by equations, their relations understood by an investigation of such equations. The solution of examples and the knowledge of particular principles lead to the demonstration of general theorems, and furnish excellent practice in reasoning, both inductive and deductive.

PROFESSOR C. A. WHEELER.



CHEMICAL LABORATORY

7. *Plane Surveying*. — Raymond. — Searles' Field Engineering. — Winter and spring terms, Senior class, five hours a week. Theory and practice, the use and care of surveying instruments, problems in surveying, railroad surveys and curves, methods of field work, computing of earth work excavations, etc.

PROFESSOR C. A. WHEELER.

8. *Arithmetic*. — Walsh's Grammar School. — Preparatory class, three terms, five hours a week. Stress is laid upon the principles of arithmetical computation in business, and an effort made to secure a foundation for the study of algebra.

MR. T. D. KNOWLES.

DEPARTMENT OF PHYSICS.

This department has a lecture room on the second floor of the Chemical Laboratory with side "cupboards" for storing apparatus for purposes of demonstration. The lecture room is provided with screens for darkening the windows. No facilities have been provided for courses in electrical engineering.

1. *General Physics*. — Wentworth and Hill. — Freshman class, three terms, four hours a week. This course includes balanced forces, fluid pressure, heat, matter, motion, energy, magnetism and electricity, sound and light.

DR. C. E. WATERS.

DEPARTMENT OF CHEMISTRY.

All regular students begin the study of this subject in the Freshman year. Both methods are in use in this course, textbook and laboratory. In the class-room the student becomes acquainted with chemical principles and the facts that are

based on experimental methods as he has been able to learn them by the manipulation and study of chemical substances.

1. *General Chemistry*. — Remsen's Elements. — Freshman class, three hours a week with an hour and one-half laboratory work, and includes chemistry of the air, oxygen, nitrogen, hydrogen, and their compounds; acids, bases, salts, carbon; atomic theory, chlorine family, the sulphur family, the potassium family, the calcium family, the aluminium family, and other metals, etc.

DR. C. E. WATERS.

2. *Qualitative Analysis*. — Stoddard. — Sophomore class, three hours a week. Lectures and laboratory work. Reactions are made by the student and expressed as far as possible in written equations.

DR. C. E. WATERS.

3. *Organic Chemistry*. — Remsen. — Junior class, three hours a week. This study includes a complete outline of the theory of the formation and structure of organic compounds. Lectures, recitations, and laboratory work.

DR. C. E. WATERS.

4. *Industrial Chemistry*. — Lectures. — Senior class, fall term, two hours a week.

DR. C. E. WATERS.

5. *Quantitative Analysis*. — Two terms, Senior class, four hours a week. Lectures and laboratory work, analysis of water, fertilizers, butter, milk, etc.

DR. C. E. WATERS.

6. *Agricultural Chemistry*. — This course is conducted by lectures and laboratory work, recitations upon the subject as

related to agriculture, as soils and their relation to plant growth, ash of the plant, and the relation of fertilizers to plant growth, etc.

PROFESSOR C. S. PHELPS.

DEPARTMENT OF GEOLOGY AND MINERALOGY.

The work of the student in this department comprises recitations, lectures, laboratory exercises, and class visits to localities where illustrations are to be seen in the natural rocks. The museum contains well-selected minerals, rocks, etc., but there is a great need of more convenient room for this department adjoining the recitation room and laboratory.

1. *Geology*. — Dana's Text-book of Geology. — Senior class, fall term, two hours a week, with laboratory work of an hour and one-half. This subject includes physiographical, structural, dynamical, and historical geology.

PROFESSOR B. F. KOONS.

2. *Mineralogy*. — Lectures and text-books. — Study of common minerals, their forms and chemical composition such as enter into the soil; ores of iron, lead, copper, zinc, tin, silver, composition and form in which they are found.

PROFESSOR B. F. KOONS.

DEPARTMENT OF ZOÖLOGY.

A special laboratory for this department is an increasing necessity, one in which not only work may be done, but with a museum of specimens necessary for instruction and illustration, both in mounted animals and insect collections. From the study of this subject the student becomes acquainted with biological laws, which are essential to a liberal education in subjects related to agriculture.

1. *Entomology*. — Senior class, summer term. Lectures and field work, collections of destructive insects, the habits of those collected, their ravages, and how to prevent the same.

PROFESSOR B. F. KOONS.

2. *Zoölogy*. — Junior class, one term. Lectures, study of types of important groups, worms, crayfish, clams, mussels, etc., with laboratory exercises.

PROFESSOR B. F. KOONS.

DEPARTMENT OF ORNITHOLOGY.

The preservation of common birds, which are especially favorable to farming interests, makes the study of this subject imperative. The subject of ornithology has proved of great interest and profit to the classes that have pursued it. It is confined to the summer term, one hour a week. The study includes a familiar acquaintance with the common birds, their habits, and economic relations to man, with museum and field work.

PROFESSOR B. F. KOONS.

DEPARTMENT OF BOTANY.

A botany laboratory adds much to the study of this subject by way of facilities for instruction and for keeping microscopes and necessary supplies, as well as specimens of material.

1. *Elementary Botany*. — Gray's Manual, Spaulding's, or other elementary text-book — Sophomore class, three terms, five hours a week. Elements of structural, systematic, and physiological botany. Students are required to prepare herbariums of fifty native wild plants.

ASSISTANT PROFESSOR H. A. BALLOU.

2. *Cryptogamic Botany*. — Campbell's Structural and Systematic Botany — Senior class, two terms, five hours a week. Laboratory work, supplemented with lectures, treating of fungus diseases, and the physiology of plants. Elective.

ASSISTANT PROFESSOR H. A. BALLOU.

DEPARTMENT OF ANATOMY AND PHYSIOLOGY.

Sophomore class, spring term, five hours a week. — Martin's Human Body with skeleton and manikin. — Lectures with a study of the animal cell, the structures of the various tissues and organs of the body and their functions, and the influence that promotes their healthy development.

PROFESSOR N. S. MAYO.

DEPARTMENT OF VETERINARY SCIENCE.

1. Senior class, fall term, five hours a week. — This department is provided with a horsikin, skeletons, and other collections of bones, etc., for illustrative teaching. Systematic dissection of subjects, lectures in veterinary anatomy, general principles of diseases and their treatment, minor surgery, wounds, veterinary obstetrics, hygienic nursing, and the application of domestic remedies. Winter and spring terms. Elective.

PROFESSOR N. S. MAYO.

2. *Bacteriology*. — Moore's Laboratory Guide. — Senior class, spring term, five hours a week. Lectures and laboratory exercises in general principles, relation of bacteria to decomposition, fermentation, contagious and infectious diseases. Elective.

PROFESSOR N. S. MAYO.

DEPARTMENT OF HISTORY.

It is the design of this department to guide the learner through the epochs of past history in such a way that he may the better understand the bearing that one epoch of history has upon each succeeding epoch, and to create a desire and taste for further investigation.

1. *Greek History*. — Fyffe. — Freshman class, fall term, three hours a week. Beginning of the Greeks, Peloponnesus, Attica, Empire of Athens, Sparta, Thebes, and the Empire of Alexander.

PROFESSOR H. R. MONTEITH.

2. *European History*. — Adams. — Sophomore class, fall term, two hours a week. Each student is required to bring to the class-room assigned topics, and be prepared for a discussion of the same; questions on the chief points of the lesson, and what information he has gleaned from independent reading. The library is well supplied with works of reference on this subject.

PROFESSOR C. A. WHEELER.

3. *American History*. — Montgomery. — Preparatory class, three terms, four hours a week.

MR. T. D. KNOWLES.

DEPARTMENT OF CIVICS.

Civil Government. — Martin's *Civil Government*. — The study of civil government is introduced early in the curriculum for the benefit of those students who, either from financial disability cannot complete their course, or drop out for other reasons. Freshman class, fall term, two hours a week. Text-book and lectures treat of the principles of civil government, its functions and departments, nature and duties of citizenship,

origin and objects of the Constitution, powers of Congress, etc.

PROFESSOR H. R. MONTEITH.

DEPARTMENT OF ECONOMICS.

Political Economy. — Thompson. — Junior class, fall term, three hours a week. The study in this course embraces the topics involving the application of economic principles, origin of political economy, conquest of nature, land and farming, labor, capital, and machinery; money and its uses, gold and silver, banking, taxation and public debt, domestic and foreign commerce, protection and free trade; communism, socialism, anarchism, etc.

PROFESSOR H. R. MONTEITH.

DEPARTMENT OF ETHICS.

Janét's Elements of Morals. — Senior class, spring term, three hours a week. Other text-books and reading are employed in this course. The aim is to give the student a comprehensive idea of the principles and obligations of an upright life and good citizenship.

PROFESSOR R. W. STIMSON.

DEPARTMENT OF ENGLISH.

English grammar and composition are studied for the most part, not as invaluable in themselves, but rather for the purpose of applying them in speaking and writing the English Language.

1. *Preparatory English.* — Three terms, four hours a week. Capitalization, punctuation, spelling, etc.

MR. T. D. KNOWLES.

2. *Grammar*.—Baskerville and Sewall.—Freshman class, three terms, four hours a week. Parts of speech, analysis of sentences, syntax, punctuation, with exercises in false syntax, study of phrases and clauses, with their proper relations, connections, etc.

3. *Grammar*. — Baskerville and Sewall. — Sophomore class, three terms, four hours a week. Subjects as in 2.

PROFESSOR H. R. MONTEITH.

DEPARTMENT OF RHETORIC AND LITERATURE.

The two most important ends to be gained from a study of English are utility and culture. In the study of grammar the former may be said to take precedence, although the recitation may contain more or less of both. Language has and will have a practical value as long as it continues to be a means of communicating thought and feeling from man to man. He who mumbles his words, or speaks his thought to others in a bungling way, only half expresses what ideas he desires to make known. As one has said, "No college man can afford to depend on others to correct his faulty speech. If he uses a wrong word, arranges the parts of the sentence improperly, gives some part an undue emphasis, or fails to indicate clearly the bearing of one sentence upon another, his language does not truly present his thought, and the world may profit little from his attempt to state it. The more valuable his thought the greater his need for a clear and effective use of language."

Good models for study, the ability to correct faulty English, a good appreciation of excellent diction, beauty and power of expression tend to make one's language not only pleasing, but powerful and persuasive. In the study of literature both culture and utility are gained, though the former may prevail over the latter; observation is closely trained, correct inferences are drawn, and the mind acquires an abiding power

that can be used in any of the tasks of life. But best of all we may keep company with the "wise and gifted" of all ages.

1. *Rhetoric*. — Hill's Foundations of Rhetoric, Buehler's Practical Exercises in English, Waddy's Elements of Composition and Rhetoric, and Pearson's Composition. — Junior class, three terms, three hours a week. Private individual conferences, lectures, recitations, and three essays.

The students read and write constantly, and the reading and writing of each are carefully criticised and directed. In this course English is studied about equally for the joy and utility of its mastery, and for the awakening of the love of good reading.

PROFESSOR R. W. STIMSON.

2. *English Literature*. — Painter's History of English Literature, Mason's Student's Readings and Questions in English Literature, Matthews' Introduction to American Literature. — Senior class, fall and winter terms, three hours a week. Lectures, discussion of masterpieces, recitations, reports, and an elaborate essay. Much reading is indicated and required. The style of each student is noted and improved. Here English is studied about equally to give increased command of English speech, to give good training in research, and to enrich those resources in the students, which, in after years, shall help them to enjoy the noblest thoughts.

PROFESSOR R. W. STIMSON.

THE DEPARTMENT OF ELOCUTION.

No attempt is made to produce orators, nor even elocutionists. But the object of this course is to correct faulty enunciation and incorrect pronunciation, to overcome em-

barrassment when speaking before an audience, to render with correct emphasis, expression, and feeling, what the masters of thought have written.

1. *Declamation*. — Freshman class, one declamation each term.

2. *Declamation*. — Sophomore class, one declamation each term.

PROFESSOR H. R. MONTEITH.

3. Junior class, winter term, one hour a week. Shoemaker's Advanced Elocution. One declamation each term.

PRESIDENT G. W. FLINT.

4. *Technique of delivery*. — Senior class, fall term. Lectures with drill. The technique and basal philosophy of delivery; practice in the higher elements of vocal and pantomimic excellence. The aim of this course, like that of 1, 2, and 3, is practical, and to promote good address.

PROFESSOR R. W. STIMSON.

5. *Prepared Address*. Senior class, three terms, one address each term. Private appointments. Each Senior prepares one address a term, and delivers it in public without notes. The subjects are chosen six weeks before the date of delivery, and both writing and delivery receive the constant criticism and suggestion of the professor. These addresses are of the greatest importance, both as a means of discipline in themselves and as giving practical point to previous instruction in English and Elocution.

PROFESSOR R. W. STIMSON.

6. *Extemporaneous Speaking*. — Senior class, winter and spring terms. Practice in class, also members of the class, at the discretion of the professor, are asked to speak ex-

temporarily in public. This exercise is intended to turn to ready account the training afforded by the Senior addresses, and to develop the ability of each member of the class to think and to express thought pointedly and progressively, under circumstances quite as trying as those likely to be found at the grange assembly, political caucus, or town meeting.

PROFESSOR R. W. STIMSON.

DEPARTMENT OF ACCOUNTING.

C. E. MYERS, Instructor.

The subject of farm accounts has not appeared in the College curriculum progressively with accounts in other lines of business. It is, therefore, the aim of the state College to give to its students, who may choose farming as their vocation, a method of "farm accounts" as systematic and as interesting as is done in trade or manufacturing, that the farmer may know conclusively each year what are his receipts and disbursements, gains or losses.

Schwartz on Book-keeping, Green's Corporation Finance, and Benjamin on Contracts. — This course consists of analysis of journal entries, ledger accounts, receipts and expenditures, analysis of balance sheets, study of columnar journals, invoice books, dairy records, crop records, laws and customs relating to checks, notes, and negotiable paper; lectures on the ethics of accounting, appreciation and depreciation of property, deferred expenses, pro ratio of losses, etc., three hours a week. Fall term, Junior class. Winter and spring terms, Junior and Sophomore classes.

DEPARTMENT OF DOMESTIC SCIENCE.

MARCIA G. GREENOUGH, Professor.

The Connecticut Agricultural College being co-educational, this department lays particular stress upon a careful

preparation for the responsibilities and duties of life in the home. Whether our girls, as managers of their own homes, shall "do their own work" is not the question; but whether or not they do, they should be trained for such work as is found in every well regulated household. The kitchen laboratory of this department is well equipped for the operations of housekeeping, lectures, and practice work. This is not a special course and separate from other lines of work, but one for all young women of the College. Seven hours a week are devoted to lecture and laboratory work, text-book study, talks, etc.

1. *Elementary Science*. — Lectures, experiments, and laboratory work on utensils, combustion, fire and water; carbonaceous foods, proteid or nitrogenous foods; fats and oils, and food value of minerals, etc.

2. *Cooking*. — In this connection special attention is given to combining ingredients and preparing meals; lectures on food economy, food values and dietaries, physiology of digestion, the art of housekeeping, laundry work, etc., preserving fruits and jellies, pickle making, etc.

3. *Cooking and Sanitation*. — Lectures, table setting, care of table furnishings, service at table, care of food, and cooking for the sick; location of house, care of the cellar, light, air, heating, moisture, drainage, plumbing, floors, walls, ventilation, and necessary requirements; chemistry as applied to cooking, and chemistry of cleaning, etc.

4. *Sewing*. — Two periods a week, with instruction in stitching, seaming, hemming, and their application in the making of garments, in mending, etc.; designing, cutting, fitting, and making of underwear, etc.

5. *Dressmaking*. — In this course young women students cut, fit, and make their own dresses under the supervision of the professor.



COLLEGE CADETS

DEPARTMENT OF MUSIC.

MARCIA G. GREENOUGH, Professor.

The object aimed at in this department is to give by systematic instruction and thorough practice to the students such a knowledge of music that they may be able to recognize and appreciate what is ennobling and beautiful in the art; and for the sake of the culture and refinement that the study of music brings to the home.

1. *Piano*. — National Graded Course, and Wagner's First Instruction. Half-hour lessons each week, with practice one hour a day; the elements of music, touch and technique, with elementary exercises, etc.

2. *Vocal Culture*. Cole's Sight Singing, and Levermore's Academy Song Book. — Freshman class, one hour a week. The value of notes, the formation of scales, and the theory of music; ease in producing tones, correctness in phrasing, and clear enunciation in singing.

DEPARTMENT OF MILITARY SCIENCE.

Assistant Professor H. A. BALLOU.

U. S. Infantry Drill Regulations. — Three hours a week, all classes during the college course.—Military drill is obligatory upon all male students of the College unless excused on account of physical disability. No attempt is made in this course to develop a professional soldier; but young men are fitted, when called to their country's service, to enter that service well schooled in military tactics, and, therefore, to be in the line of promotion. The cadet, however, who takes a full college course, should acquire a dignified carriage, deport himself as a gentleman at all times, have a wholesome respect for discipline, acquire habits of neatness, order, punctuality, and promptness. Lectures are given in military science, recitations on the subject are required, and the College fur-

nishes the necessary arms and military accouterments for drill and practice. A uniform is prescribed, and must be worn during the military drill. The expense of the uniform is \$14. Absence from drill must be made up at such times and in such ways as the commandant may decide.

LECTURE DEPARTMENT.

The following lectures were delivered before the student body during the college year:

- Professor R. G. Hibbard, New Britain, "Good Reading."
 Mr. J. B. Kendrick, Wallingford, "The Theory and Practice of Accounting and Auditing," three lectures.
 Dr. Wm. A. Mowry, Hyde Park, Mass., "Our Civil Government,—Its Simplicity, Its Strength, and Its Weaknesses."
 Professor Wm. North Rice, Wesleyan University, "Geology of Connecticut."
 Mr. James L. Cowles, Farmington, "The Post-Office and the Farmer."
 Professor Geo. H. Palmer, Harvard University, "Wordsworth."
 Professor R. E. Dodge, Columbia University, "The Colorado Plateaux of New Mexico."
 Dr. J. B. Paige, Amherst, Mass., "Stable Ventilation."
 Professor J. J. Hills, Burlington, Vt., "Private Dairying."
 Professor L. R. Jones, Burlington, Vt., "Bees, Flowers, and Fruit."
 Mr. Geo. H. Pollard, South Attleboro, Mass., "Water Fowls."
 Mr. E. H. Stadtmueller, West Hartford, "Raising Milk for the Trade."
 Mr. J. H. Hale, Glastonbury, "Details in Farm Business."

SENIOR ELECTIVES.

Winter and Spring Terms, 1901.

1. Students are required to decide upon the Elective Course on or before December 15, 1900.
2. No student will be allowed to change his course, or any subject in that course, after the above date.
3. Each student will be allowed a minimum of fifteen and a maximum of twenty hours a week, two laboratory hours being equivalent to one hour of class work.

4. English and one of the following subjects must be included in each student's course: Mathematics II, Agriculture, or Horticulture. But a student *may* take all four, if so inclined.

AGRICULTURE.

1. *Winter Term.*—Lectures three hours a week, study of Station reports and bulletins one hour a week.—Sheep husbandry, breeds, care and management; early lambs. Swine breeding, care and management.

2. *Spring Term.*—Lectures three hours a week, study of Station reports and bulletins one hour a week.—Rural economy; rural law, farm management, capital, labor, and equipment. General farming versus specialties. Farm buildings, etc.

PROFESSOR C. S. PHELPS.

DAIRYING.

Winter Term.—Advanced work in dairying, laboratory eight hours a week, full course. Four hours a week, half course. Thesis required. (Thesis counts as one hour a week of lecture work.)

ASSISTANT PROFESSOR C. L. BEACH.

HORTICULTURE.

1. *Winter Term.*—Economic Botany three hours a week. Landscape gardening two hours a week.

2. *Spring Term.*—Plant diseases three hours a week, laboratory work four hours a week.

PROFESSOR A. G. GULLEY.

NATURAL SCIENCE.

1. *Winter and Spring Terms.* — Entomology, economic or general, mostly laboratory work, four hours a week.

2. *Winter and Spring Terms.* — Zoölogy, systematic and laboratory work on any preferred branch of the animal kingdom, four hours a week.

3. *Winter and Spring Terms.* — Mineralogy, laboratory work four hours a week.

4. *Winter and Spring Terms.* — Geology, text-book and laboratory work four hours a week.

PROFESSOR B. F. KOONS.

MATHEMATICS.

1. *Winter and Spring Terms.* — Free-hand drawing one hour a week.

2. *Winter and Spring Terms.* — Railroad curves, computations of excavations, higher plane surveying, plotting, etc., four hours a week.

PROFESSOR C. A. WHEELER.

BOTANY AND FORESTRY.

1. *Winter and Spring Terms.* — Botany. — Lectures two hours a week, laboratory work two hours a week.

2. *Winter and Spring Terms.* — Forestry. — Winter term, lectures three hours a week. Spring term, lectures two hours, and laboratory work four hours a week.

ASSISTANT PROFESSOR H. A. BALLOU.

MECHANICS.

Winter and Spring Terms. — Mechanical drawing and science of carpentry one hour a week.

PROFESSOR H. S. PATTERSON.

CHEMISTRY.

Winter, or Winter and Spring Terms.—Quantitative Analysis.—Lectures one hour a week, laboratory work six hours a week.

DR. C. E. WATERS.

VETERINARY SCIENCE.

1. *Winter Term.*—Veterinary Science three hours a week.
2. *Spring Term.*—Bacteriology five hours a week, four hours laboratory, and one hour lecture.

PROFESSOR N. S. MAYO.

HISTORY.

1. *Winter and Spring Terms.*—Economic History of the United States—Text-book and lectures, four hours a week.
2. (a) *Winter Term.*—History of Mediæval Europe, Rise of Modern Nations, two hours a week. (b) *Spring term.*—English History, Rise and Growth of Parliamentary Government.—Lectures and text-book, two hours a week.
3. *Winter and Spring Terms.*—United States Constitutional History—Lectures, two hours a week.

PROFESSOR H. R. MONTEITH.

FARM ACCOUNTS.

1. *Winter Term.*—Laboratory work, two hours a week.
2. *Spring Term.*—Lectures and laboratory work one hour a week.

MR. C. E. MYERS.

EXTENSION DEPARTMENT.

The "Reading Course" and the "Correspondence Course" have become important factors among people removed from centers where no libraries exist, and for those who cannot, or will not, spend time in college for intellectual development. This course rightly begun and persistently followed will prove of great interest and benefit to the State.

COURSE OF STUDY.

FIRST YEAR.

For Women.

Floriculture.
Domestic Science.
General Science.
Botany.

For Men.

Agriculture.
Agricultural Chemistry.
General Science.
Botany.

SECOND YEAR.

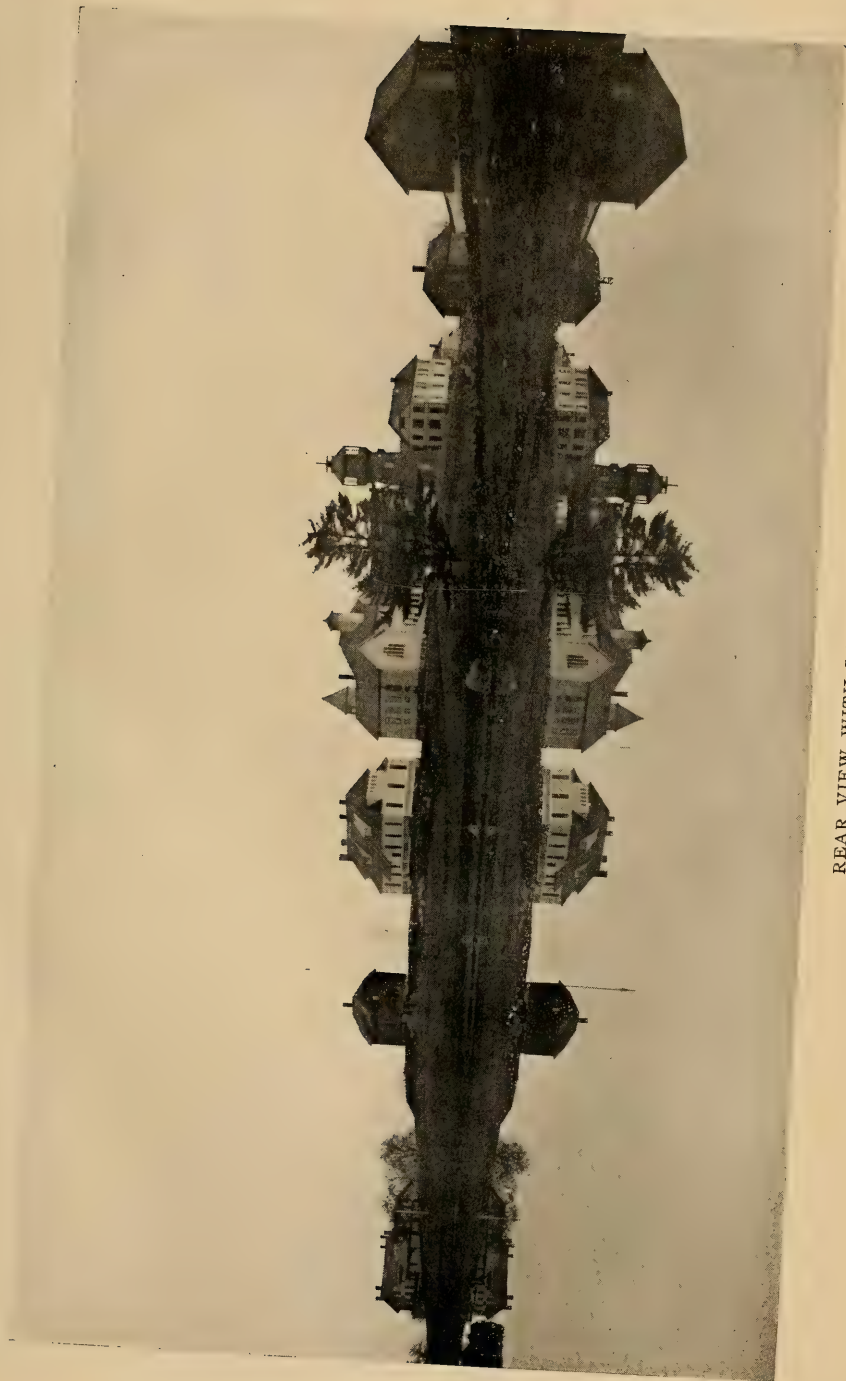
For Women.

The way we did at the Cooking
School.
Hygiene and Physiology or
Physical Development.
Realm of Nature, Part I.
The Story of Germ Life.

For Men.

The Principles of Fruit Growing, or
Milk and Its Products.
The Spraying of Plants, or
Farmers' Bulletins.
Realm of Nature, Part I.
The Story of Germ Life.

Any inquiries regarding this course, or the selection of agricultural or rural books, will receive prompt attention by addressing THE CONNECTICUT AGRICULTURAL COLLEGE, *Extension Department.*



REAR VIEW WITH LAKE — 1898

SCHEDULED OUTLINE OF STUDY.

FRESHMAN YEAR.

NOTE.— The numbers refer to the periods per week.

FALL TERM.		WINTER TERM.		SPRING TERM.	
Algebra, . . .	4	Algebra, . . .	4	Algebra, . . .	4
Chemistry, . .	3	Chemistry, . .	3	Chemistry, . .	3
Civics, . . .	2	Civics, . . .	2	Civics, . . .	2
Drawing-F, . .	1	Drawing-M, . .	2	English, . . .	4
English, . . .	4	English, . . .	4	History, . . .	3
History of Greece, .	3	History, . . .	3	Physics, . . .	4
Physics, . . .	4	Physics, . . .	4	Singing, . . .	1
Singing, . . .	1	Singing, . . .	1	Military Drill, .	3
Military Drill, .	3	Military Drill, .	3	Rhetoricals.	
Rhetoricals.		Rhetoricals.			

SOPHOMORE YEAR.

FALL TERM.		WINTER TERM.		SPRING TERM.	
Agriculture, . .	3	Bookkeeping, . .	1	Agriculture, . .	3
Botany, . . .	4	Botany, . . .	4	Bookkeeping, . .	1
Chemistry, . .	3	Chemistry, . .	3	Botany, . . .	4
English, . . .	4	Drawing-M, . .	2	Chemistry, . .	3
Geometry, . . .	4	English, . . .	4	English, . . .	4
History, . . .	2	Geometry, . . .	4	Geometry, . . .	4
Military Drill, .	3	Poultry Industry, .	4	Physiology, . .	5
Rhetoricals.		Wood-work, . .	3	Military Drill, .	3
		Military Drill, .	3	Rhetoricals.	
		Rhetoricals.			

JUNIOR YEAR.

FALL TERM.		WINTER TERM.		SPRING TERM.	
Agriculture, . .	3	Bookkeeping, . .	2	Agriculture, . .	3
Bookkeeping, . .	3	Chemistry, . .	2	Bookkeeping, . .	2
Chemistry, . .	2	Dairying, . . .	4	Chemistry, . .	2
Elocution, . .	1	Dairy Laboratory, .	8	Elocution, . .	1
English, . . .	3	Drawing-M, . .	2	English, . . .	3
Geometry-S, . .	3	Elocution, . . .	1	Political Economy, .	3
Horticulture, . .	3	English, . . .	3	Surveying, . . .	2
Military Drill, .	3	Horticulture, . .	4	Zoölogy, . . .	3
Rhetoricals.		Horticulture Lab- oratory, . . .	6	Military Drill, .	3
		Trigonometry, . .	3	Rhetoricals.	
		Military Drill, .	3		
		Rhetoricals.			

CATALOGUE OF THE

SENIOR YEAR.

SUMMER TERM.		FALL TERM.		FALL TERM.— <i>Con.</i>	
Agriculture, . . .	3	Analytic Geometry, . . .	3	Geology Laboratory, . . .	2
Entomology, . . .	5	Agriculture, . . .	3	Meteorology, . . .	3
Horticulture, . . .	3	Chemistry, . . .	2	Veterinary Science, . . .	5
Ornithology, . . .	3	Elocution, . . .	1	Military Drill, . . .	3
Instructive Labor.		English Literature, . . .	3	Senior Addresses.	
		Geology, . . .	3		

DOMESTIC SCIENCE.

FRESHMAN YEAR.

FALL TERM.		WINTER TERM.		SPRING TERM.	
Lectures, . . .	1	Sewing, . . .	2	Sewing, . . .	2
Hygiene, . . .	1	Hygiene, . . .	1	Hygiene, . . .	1

SOPHOMORE YEAR.

FALL TERM.		WINTER TERM.		SPRING TERM.	
Sewing, . . .	4	Sewing, . . .	3	Lectures, . . .	1
Cooking, . . .	2	Cooking, . . .	2	Cooking, . . .	2
Hygiene, . . .	1	Hygiene, . . .	1	Hygiene, . . .	1

JUNIOR YEAR.

FALL TERM.		WINTER TERM.		SPRING TERM.	
Lectures, . . .	1	Lectures, . . .	1	Sewing, . . .	2
Cooking, . . .	1	Cooking, . . .	1	Laundrying, . . .	2
Hygiene, . . .	1	Hygiene, . . .	1	Lectures, . . .	1
				Hygiene, . . .	1

SENIOR YEAR.

FALL TERM.		WINTER TERM.		SPRING TERM.	
Drafting, . . .	4	Dressmaking, . . .	4	Dressmaking, . . .	4
Lectures, . . .	1	Lectures, . . .	1	Lectures, . . .	1
Hygiene, . . .	1	Hygiene, . . .	1	Hygiene, . . .	1

PREPARATORY YEAR.

FALL TERM.		WINTER TERM.		SPRING TERM.	
Arithmetic, . . .	5	Arithmetic, . . .	5	Arithmetic, . . .	5
English, . . .	4	English, . . .	4	English, . . .	4
Geography, Phys- ical, . . .	2	Geography, Phys- ical, . . .	2	Geography, Phys- ical, . . .	2
History, U. S., . .	4	History, U. S., . .	4	History, U. S., . .	4
Singing, . . .	1	Singing, . . .	1	Singing, . . .	1
Military Drill, . .	3	Military Drill, . .	3	Military Drill, . .	3

TEXT-BOOK LIST.

Advanced Elocution, Shoemaker.
American Fruit Culturist, Thomas.
Analytic Geometry, Wentworth.
A Text-Book of Physics, Wentworth and Hill.
Boston Cook Book, Lincoln.
Composition and Rhetoric, Waddy.
Composition, Freshman, Pearson.
Civil Government, Martin.
Computation Tables, Crandall.
Dairy Bacteriology, Russell.
De Pontibus, Waddell.
Elements of Chemistry, Remsen.
Elementary Botany, Kellerman.
Elements of Structural Botany, Campbell.
Elements of Morals, Janét.
English Grammar, Baskerville and Sewall.
English, Practical Exercises in, Buehler.
English Literature, History of, Painter.
English Literature, Student's Readings and Questions in,
Mason.
European History, Adams.
Feeds and Feeding, Henry.
Fertility of Soil, Roberts.
Field Surveying, Searles.
Foundations of Rhetoric, Hill.
Gardening for Profit, Henderson.
Grammar School Arithmetic, Walsh.
History of Greece, Fyffe.
History of Rome, Creighton.
Inorganic Chemistry, Remsen.
Introduction to American Literature, Matthews.
Laboratory Manual of Physics, Gage.
Landscape Gardening, Waugh.
Manual of Arms, Caliber .45 and .50.

Mediaeval Civilization, Adams.
Milk and its Products, Wing.
National Graded Course in Music.
New School Algebra, Wentworth.
North America, Carpenter.
Office Routine and Bookkeeping, Schwartz.
Organic Chemistry, Remsen.
Ornamental Gardening, Long.
Physical Mathematics, Bourgougnon.
Physiology and Hygiene, Martin.
Plane Geometry, Pettee.
Plane Surveying, Raymond.
Political Economy, Thompson.
Practical Forestry, Fuller.
Practical Studies in Botany, Kellerman.
Profitable Poultry-Keeping, Beale-Weld.
Qualitative Chemistry, Stoddard.
Quantitative Chemistry, Remsen.
Realm of Nature, Mills.
Soils and Crops, Hunt and Morrow.
Solid Geometry, Wentworth.
Stock Breeding, Miles.
The Academy Song Book, Levermore.
Text-Book of Geology, Dana-Rice.
Text-Book on Roads and Pavements, Spalding.
The Soil, King.
The Transition Curve, Crandall.
Trigonometry, Wentworth.
U. S. History, Montgomery.
U. S. Army and Infantry Drill Regulations.

COMMENCEMENT EXERCISES.

WEDNESDAY, JUNE 13, 1900.

10.00 o'clock A. M., on the College Campus.

PROGRAMME.

Part I.

1. MUSIC: Orchestra, Overture, "Castle Gate," . . . *R. Schlepegrel*
2. PRAYER.
3. MUSIC: Orchestra, "Under the Mistletoe," . . . *R. Gruenwald*
4. HERMAN DEANE EDMOND, . . . "War and Peace"
5. HANNAH BERTHA SQUIRE, . . . "Education for Domestic Life"
6. HESTER CLARICE HALL, . . . "Not as the Other Half Lives"
7. JOHN BOWERS LYMAN, . . . "The Value of Good Training"
8. HORACE GEORGE WILLIAMS, . . . "Plant Diseases"
9. MUSIC: Orchestra, "Cotrin Waltzes," . . . *C. W. Bennett*
10. IRVING CHARLES KARR, . . . "Steam Railway Passenger Traffic"
11. CHRISTIE JENNIE MASON, . . . "Canning"
12. EDNA MABEL NASON, . . . "The College Girl in the Country Town"
13. LENA ELIZA LATIMER, . . . "Silent Forces"
14. EDWIN STANLEY BISHOP, . . . "The Student and the Farm"

Part II.

15. MUSIC: Duet (Clarinet and Flute), "Minnehaha," . . . *Barnard*
16. ALBERT VINCENT OSMUN, . . . "The Importance of Entomology"
17. *MARIE CARRIE BROWN, . . . "Character is Property"
18. EDITH SARA LATIMER, . . . "The Sea and Some of its Creatures"
19. ANNA CHRISTINA JACOBSON, . . . "Self-Reliance"
20. HARRY DAVID EMMONS, . . . "A Commencement Day Prediction"
21. MUSIC: Orchestra, "Chicago Post," . . . *E. Brooks*
22. GERTRUDE ELIZA GRANT, . . . "The Imagination"
23. FREDERICK JOSEPH BALDWIN, . . . "Oleomargarine"§
24. EVA BELLE MASON, . . . "The Choice of Current Literature"
25. MUSIC: Orchestra, "Sweet Memories," . . . *R. Gruenwald*

Honor positions on the programme given for } 1st—EVA BELLE MASON
the highest standing during the College Course. } 2d—HERMAN DEANE EDMOND

* Excused from Reading.

§ (See pamphlet, "The Grout Bill, Some Reasons Why it Should be Passed by Congress, Swift & Company Answered," by Chas. Y. Knight, Secretary National Dairy Union, Chicago, Ill.)

AFTERNOON EXERCISES.

2 o'clock.

MUSIC.

Orchestra, Overture, "Bridal Rose," *Lavalley*

COMMENCEMENT ADDRESS.

"Rascals and Saints," DR. ALBERT E. WINSHIP, Boston

MUSIC.

Orchestra, Selection, Lucia de Lammermoor, *W. Bendix*

CONFERRING DIPLOMAS.

AWARD OF THE RATCLIFF HICKS PRIZES.

MUSIC.

Orchestra, "Colored Guard," *Anon.*

ENTRANCE EXAMINATION.

1900.

ARITHMETIC.

1. What is a fraction? $\frac{2\frac{1}{2} + 3\frac{1}{2} \div \frac{8}{4}}{4\frac{1}{3} - \frac{7}{9} \times \frac{2}{3}} = ?$
2. Find the least common multiple and the highest common factor of 30, 15, 24, and 27.
3. What is the square root of 32761?
4. At 4 cents a pint what would 1 3-4 bushels of peanuts cost?
5. How many ounces avoirdupois in 3 tons, 64 pounds?
6. Change 3-4 to a fraction whose denominator is 32.
7. If 5-9 of a mill is worth \$2500, what is 5-6 of the mill worth?
8. Multiply .006 by .06 and divide the product by 2.
9. Find the simple interest of \$300 for 4 years, 3 months, and 12 days at 6%.
10. A boy buys chestnuts at \$2.50 a bushel and sells them at 5 cents a pint. What per cent. profit does he make?

ENGLISH GRAMMAR.

1. Write the parts of speech and give an example of each.
2. What part of speech is *I, You, He, She*? Decline *We*.
3. What *cases* have nouns? Give the cases of the noun *horse*.
4. Compare *good, bad, full, ill, little*.
5. What is a transitive verb? An intransitive verb? Illustrate each by a sentence.
6. Write a sentence using the verb *sit* in the past tense. Write a sentence using the verb *set* in the future tense.
7. Write the passive voice, perfect tense, indicative mood, third singular of the verb *love*, of the verb *lie* (to recline); of the verb *lay*, of the verb *dig*.
8. Write the possessive singular of *man*, the possessive plural of *men*, the possessive singular of *princess*, the possessive plural of *it*. Write the plural of *valley, mouse, child, spoonful*.

9. Analyze and parse the following sentence : Thy word is a lamp unto my feet, and a light unto my path.

10. Correct errors in the following sentences :

- a. Can I go with james to School ?
 - b. I aint done none of my problems.
 - c. He says he don't know nothing about it.
 - d. Those kind of apples will not keep.
 - e. I intended to have done it.
 - f. Has each one found their place ?
 - g. He is stopping at the hotel.
 - h. We shall not have company without it clears up.
 - i. There is an old man in town whom they say is very feeble.
 - j. We shall trust neither him or his son.
-

UNITED STATES HISTORY.

1. How did America receive its name ? When does American History begin ?
 2. Mention any evidence that Europeans had come to America before Columbus.
 3. What people first colonized New England ? When ? Where ? What territory was colonized by the Spanish ? By the Dutch ?
 4. What territory has been purchased from France ? From Russia ? From Spain ?
 5. What were the three principal causes that led to the Declaration of Independence ?
 6. Mention the principal wars since the Revolution, giving dates and the causes which led to them.
 7. What was the last war and what was the cause of it ?
 8. What political parties existed in the United States before the Civil War ?
 9. Explain the Monroe Doctrine ; the Omnibus Bill ; Missouri Compromise.
 10. Write one page about the Puritans.
-

GEOGRAPHY.

1. In what country do you live ? Under what kind of government ? Composed of what ? How many ?
2. What is the capital of the United States ? Where situated ? What is the capital of a country or state ?

3. What territories were last acquired by the United States? Where situated?

4. What government controls the Philippine Islands? Locate Manila.

5. From what state do we obtain coal? Iron? Gold? Silver? Copper?

6. Mention three states noted for manufactures, and give the capital of each.

7. Name the largest city in the United States. The most western city. Locate them.

8. Name the largest river in the United States. Its two largest tributaries? Into what water does it empty? What cities on its banks?

9. Locate Savannah; Austin; Norfolk; Mobile; Denver; Key West.

10. Define Zone; Meridian; Latitude; Longitude; mention and locate all the Zones. Locate Cape Horn; Cape of Good Hope; the island of Madagascar; the Transvaal; the island of Luzon; Hudson's Bay; the Baltic Sea; the Isle of Man.



CLASS OF 1901

ROSTER OF STUDENTS.

Post-Graduates.

Name.	Town.	County.
Emmons, Harry David, 1900, . . .	Plymouth,	Litchfield.
Karr, Irving Charles, 1900, . . .	West Haven,	New Haven.
Lyman, John Bowers, 1900, . . .	East Hampton,	Middlesex.
Osmun, Albert Vincent, 1900, . . .	Brooklyn, N.Y.,	Kings.
Clark, John Werden, Yale, 1900, . . .	Saybrook,	New London.

Graduates of 1900.

Baldwin, Frederick Joseph, . . .	Watertown,	Litchfield.
Bishop, Edwin Stanley, . . .	Clintonville,	New Haven.
Brown, Marie Carrie, . . .	Spring Hill,	Tolland.
Edmond, Herman Deane, . . .	Westminster,	Windham.
Emmons, Harry David, . . .	Plymouth,	Litchfield.
Grant, Gertrude Eliza, . . .	Mount Hope,	Tolland.
Hall, Hester Clarice, . . .	Willington,	Tolland.
Jacobson, Anna Christina, . . .	Gurleyville,	Tolland.
Karr, Irving Charles, . . .	West Haven,	New Haven.
Latimer, Edith Sara, . . .	West Simsbury,	Hartford.
Latimer, Lena Eliza, . . .	West Simsbury,	Hartford.
Lyman, John Bowers, . . .	East Hampton,	Middlesex.
Mason, Christie Jennie, . . .	Mansfield,	Tolland.
Mason, Eva Belle, . . .	Mansfield,	Tolland.
Nason, Edna Mabel, . . .	Gurleyville,	Tolland.
Osmun, Albert Vincent, . . .	Brooklyn, N.Y.,	Kings.
Squire, Hanna Bertha, . . .	Storrs,	Tolland.
Williams, George Horace, . . .	East Hartford,	Hartford.
Total, . . .		19.

Senior Class,

1901.

Blakeslee, Joseph Howard, . . .	Plymouth,	Litchfield.
Brown, Edwin Pike, . . .	Vernon Center,	Tolland.
Dimock, William Wallace, . . .	Merrrow,	Tolland.
Downing, Theodore Francis, . . .	North Windham,	Windham.
Fairchild, Charles Wentworth, . . .	Nichols,	Fairfield.
Kuzirian, Elia Tom, . . .	Storrs,	Tolland.
Plumb, Frederick Henry, . . .	Nichols,	Fairfield.

Name.	Town.	County.
Pratt, Frederic William, . . .	Deep River,	New London.
Thorpe, Walter Franklin, . . .	North Haven,	New Haven.
Vallett, John Hamilton, . . .	Uncasville,	New London.
Total,		10.

Junior Class,**1902.**

Bushnell, Howard Linden, . . .	Danielson,	Windham.
Carpenter, John Skinner, . . .	East Hampton,	Middlesex.
Clark, Alfred Byron,	Beacon Falls,	New Haven.
Clark, Arthur Nathaniel, . . .	Old Saybrook,	New London.
Crowell, Stephen Mills,	Middletown,	Middlesex.
Farrell, John Joseph,	Storrs,	Tolland.
Foubert, Charles Leon,	Danbury,	Fairfield.
Freeman, Vera Estelle,	Spring Hill,	Tolland.
Goodrich, Elizabeth Emily, . .	East Hampton,	Middlesex.
Gorton, Alfred Carl,	New London,	New London.
Harvey, Leslie Ford,	Minortown,	Litchfield.
Hollister, George Herbert, . . .	Washington,	Litchfield.
Jackson, Frederic Augustus, . .	Storrs,	Tolland.
Lamson, George Herbert, Jr., . .	East Hampton,	Middlesex.
Olin, Jennie Maude,	Plainfield,	Windham.
Twing, James Byron,	Wallingford,	New Haven.
Wheeler, Laura Josephine, . . .	Trumbull,	Fairfield.
Total,		17.

Sophomore Class,**1903.**

Averill, Ralph Johnson,	Washington,	Litchfield.
Clark, Clifford Phillip,	Prospect,	Litchfield.
Conger, Anna Martha,	Storrs,	Tolland.
Dewey, Charles Wheeler,	Wapping,	Hartford.
Ford, Frederic Jerome,	Washington,	Litchfield.
Garrigus, Annie Belle,	Wolcott,	New Haven.
Garrigus, Minnie Belle,	Wolcott,	New Haven.
Hale, Moseley,	So. Glastonbury,	Hartford.
Hauck, Arthur Charles,	Spring Hill,	Tolland.
McLean, Samuel George,	So. Glastonbury,	Hartford.
Mitchell, Warren Elliot,	New Haven,	New Haven.
Pierpont, Morton Elbert,	Waterbury,	New Haven.
Shaffer, Harry Cecil,	Derby,	New Haven.
Stocking, Wilber Foshay,	Weatogue,	Hartford.
Storrs, Ada May,	Spring Hill,	Tolland.
Walters, George Edward,	Bridgeport,	Fairfield.
Total,		16.

Freshman Class,**1904.**

Name.	Town.	County.
Akers, Arthur Clarence, . . .	Mansfield,	Tolland.
Akers, David Lawrence, . . .	Mansfield,	Tolland.
Akers, Ella Margaret, . . .	Mansfield,	Tolland.
Colman, Edith, . . .	South Coventry,	Tolland.
Dewell, Robert Treat, . . .	Orange,	New Haven.
Dimock, Edwin Ray, . . .	Merrow,	Tolland.
Dimock, Rosa Warner, . . .	Merrow,	Tolland.
Harding, Dora Imogene, . . .	Lyme,	New London.
Hinman, Robert Earl, . . .	Collinsville,	Hartford.
Koons, Grace Elizabeth, . . .	Storrs,	Tolland.
Mexcur, Carl Dwight, . . .	Bloomfield,	Hartford.
Monteith, Marjorie Ruthven, . . .	Unionville,	Hartford.
Moriarty, Edward Henry, . . .	East Hampton,	Middlesex.
Moriarty, Mary Ella, . . .	Merrow,	Tolland.
Morse, Charles Taylor, . . .	Shelton,	Fairfield.
Pattison, Charles Nelson, . . .	Norwich,	New London.
Preston, Miles Bailey, 2d, . . .	Hartford,	Hartford.
Rust, May Alice, . . .	Farmington,	Hartford.
Selby, Maude Elizabeth, . . .	Simsbury,	Hartford.
Shurtleff, Dwight Knowlton, . . .	West Ashford,	Tolland.
Sill, Earl Bailey, . . .	Rockville,	Tolland.
Southwick, Clara Marie, . . .	Mansfield,	Tolland.
Storrs, Gilbert Holland, . . .	Spring Hill,	Tolland.
Taylor, Robert Kellogg, . . .	So. Glastonbury,	Hartford.
Thorpe, Gertrude Leila, . . .	North Haven,	New Haven.
Trowbridge, John Work, . . .	Pomfret,	Windham.
Woolcott, Marion Helen, . . .	Long Hill,	Fairfield.
Woodward, Sherman Prindle, . . .	Bethany,	New Haven.
Total, . . .		28.

Special Class.

Dallas, Bertha S., . . .	Storrs,	Tolland.
Dresser, Bertha May, . . .	Bristol,	Hartford.
Herold, Gertrude Marie, . . .	Terryville,	Litchfield.
Holt, Jessie Truesdell, . . .	Willington,	Tolland.
Stocking, James Magee, . . .	Weatogue,	Hartford.
Total, . . .		5.

Preparatory Class.

Gulley, Roy Clinton, . . .	Storrs,	Tolland.
Kuzirian, Nshan, . . .	Storrs,	Tolland.
Mann, Philip James, . . .	Montville,	New London.
Reichmak, John, . . .	Watertown,	Litchfield.
Total, . . .		4.

Short Dairy Course.**1900.**

Bidwell, Albert F.,	Canton Center, Conn.
Canfield, Samuel M.,	South Britain, Conn.
Cass, Henry E.,	Waterbury, Conn.
Griffiths, John E.,	Moosup Valley, R. I.
Hitchcock, Lewis B.,	Waterbury, Conn.
Kohles, Herman,	Fitchburg, Mass.
Marion, Frederick L.,	North Woburn, Mass.
Southwick, Walter A.,	Mansfield, Conn.
Whitehead, Joseph F.,	Washington Depot, Conn.
Wikoff, D. W.,	Meriden, Conn.
Total,	10.

Poultry Course.**1900.**

Parker, Lucien,	South Coventry, Conn.
Total,	1.

Summary.

Post-Graduates,	5
Class of 1900,	18
Senior Class,	10
Junior Class,	16
Sophomore Class,	17
Freshman Class,	28
Special Class,	5
Preparatory Class,	4
Dairy Students,	10
Poultry Students,	1
Total counting none twice,	110

CLASS OFFICERS.

1901. J. H. Blakeslee,	President.
1902. A. N. Clark,	President.
1903. M. E. Pierpont,	President.
1904. D. K. Shurtleff,	President.

COLLEGE ORGANIZATIONS.

Eclectic Literary Society.

This Society holds weekly meetings for the purpose of improvement in writing and speaking. Original papers, declamations, and *ex tempore* debates are the principal features of its regular programs.

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Alethia Society.

The Alethia Society is composed of young women. Its purpose is literary improvement. It offers a weekly program of readings, essays, criticisms, and social functions.

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College Shakespearean Club.

The Shakespearean Club, like the above, has for its object the mental culture of its members. Weekly programs of declamations, essays, and debates afford an ample field for the exercise of literary ability and oratorical genius.

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Young Men's Christian Association.

The Young Men's Christian Association is organized by the students for the promotion of Christian fellowship among its members, and for the purpose of raising a higher standard of manhood among all students.

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Mutual Refinement Society.

The Mutual Refinement Society is an association of young men of the College, founded for the purpose of stimulating them to the habitual use of pure speech and refined language, and by their words to justify the title of "gentleman."

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F. W. Pratt,	S. G. McLean,	



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Football Team, 1900.

J. H. Blakeslee,	.	.	.	Captain.
A. B. Clark,	.	.	.	Manager.
J. H. Blakeslee,	.	.	.	Right End.
J. S. Carpenter,	.	.	.	Right Tackle.
J. H. Vallett,	.	.	.	Right Guard.
Moseley Hale,	.	.	.	Center.
L. F. Harvey,	.	.	.	Left Guard.
J. B. Twing,	.	.	.	Left Tackle.
E. H. Moriarty,	.	.	.	Left End.
E. P. Brown,	.	.	.	Right Half Back.
A. V. Osmun,	}	.	.	Quarter Back.
T. F. Downing,	}	.	.	
J. B. Lyman,	.	.	.	Left Half Back.
A. N. Clark,	.	.	.	Full Back.
R. J. Averill,	}	.	.	Substitutes.
W. W. Dimock,	}	.	.	

Polo Team, 1900.

I. C. Karr,	.	.	.	Captain.
T. F. Downing,	.	.	.	Manager.
I. C. Karr,	.	.	.	Goal.
T. F. Downing,	.	.	.	Half Back.
J. H. Blakeslee,	.	.	.	Center.
J. B. Lyman,	.	.	.	First Rush.
S. G. McLean,	.	.	.	Second Rush.
L. F. Harvey,	.	.	.	Substitute.

Baseball Team, 1900.

S. G. McLean,	.	.	.	Captain.
H. G. Williams,	.	.	.	Manager.
S. G. McLean,	.	.	.	Pitcher.
J. B. Lyman,	.	.	.	Catcher.
E. S. Bishop,	.	.	.	First Base.
J. H. Blakeslee,	.	.	.	Second Base.
E. H. Moriarty,	.	.	.	Third Base.
T. F. Downing,	.	.	.	Short Stop.
L. F. Harvey,	.	.	.	Right Field.
F. W. Pratt,	.	.	.	Center Field.
I. C. Karr,	}	.	.	Left Field.
G. H. Lamson,		.	.	
H. C. Shaffer,	.	.	.	Substitute.

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W. W. Dimock,	.	.	Cadet First Lieutenant.
E. P. Brown,	.	.	Cadet Second Lieutenant.
F. H. Plumb,	.	.	Cadet First Sergeant.
E. T. Kuzirian,	.	.	Cadet Quartermaster Sergeant.
F. W. Pratt,	.	.	} Cadet Sergeants.
J. H. Blakeslee,	.	.	
C. W. Fairchild,	.	.	
W. F. Thorpe,	.	.	

J. H. Vallett, .	.	.	}	Cadet Corporals.
G. H. Lamson,	.	.		
J. B. Twing, .	.	.		
G. H. Hollister, .	.	.		
L. F. Harvey,	.	.		

ALUMNI ASSOCIATION.

Arthur J. Pierpont, '95,	.	.	President.
Charles R. Green, '95,	.	.	Secretary.
A. C. Gilbert, '97,	.	.	Treasurer.

One Vice-President is elected from each class upon graduation.

ALUMNI.

1883.

Fred Birge Brown,	Lumber Dealer,	Mobile, Ala.
Charles Spencer Foster,	Buffer,	Terryville, Conn.
Henry Richard Hoisington, Jr.,	Farmer,	Coventry, Conn.
Burke Hough,	Groceryman,	Northampton, Mass.
Arthur Sherwood Hubbard,	Emp'd in Mfy.,	Glastonbury, Conn.
Andrew Keith Thompson,	Express Agent,	New Haven, Conn.

1884.

Clifford S. Barnes,	Liveryman,	Bristol, Conn.
Jerry Lincoln Fenn,	Asst. Clerk	
	Superior Court,	Hartford, Conn.
Frank S. Hubbard,	Emp'd in Mfy.,	Winsted, Conn.
Andrew Hyde,	Vet. Surgeon,	Norwich, Conn.
Fred C. Leavens,	Farmer,	Wauregan, Conn.
Samuel Q. Porter,	Farmer,	Panora, Iowa.

1885.

Robert A. Ayer,	Lumberman,	Olympia, Wash.
Horace S. Eaton,	Farmer,	Fairfax, Vt.
Frank E. Fenner,	Merchant,	Waterbury, Conn.
Archer C. Ford,	Orchardist,	Grant's Pass, Oregon.
Royal E. Myers,	Medicine,	Baltimore, Md.
Isaac B. Wakeman,	R.E.D. & Bkr.,	149 Broadway, N. Y.

1886.

John H. Atkins,	Farmer,	Middletown, Conn.
Eugene A. Bailey,*		
Edgar S. Blair,		Address not known.
Wilbur L. Chamberlain,	Farmer,	West Brookfield, Mass

* Died Sept. 18, 1895, at Loveland, Col.

Fred T. Coe,	Bookkeeper,	93 Camp Street, Meriden, Conn.
John H. Gardner, Jr.,	Vet. Surgeon,	Norwich, Conn.
Henry R. Hayden,	Architect,	Northampton, Mass.
Selden W. Hayes,	As't. Prin. F. Sch.,	Hartford, Conn.
Bruce Hough,	Chair Mfr.,	West Gardner, Mass.
Edgar J. Leavenworth,	Farmer,	Ansonia, Conn.
John B. Perry,	Farmer,	Clark's Fall, Conn.
Arthur L. Reed,		Address not known.
Fred A. Robinson,	Dentist,	Shanghai, China.
Ira B. Smith,	Salesman,	Pensacola, Fla.

1887.

Dexter E. Hall,	Salesman,	Box 1382, Meriden, Conn.
William J. Irwin,	Emp'd in Mfy.,	15 Oak St., Hartford, Conn.
William S. Lee,	Farmer,	Hanover, Conn.
Sidney H. Perry,	Salesman,	Danielson, Conn.
Edward F. Weed,	Supt. of R. E.,	Rowayton, Conn.
John W. Yeomans,	Emp'd in Mfy.,	Hopedale, Mass.

1888.

Willette Lincoln Alley,	Butcher,	Banksville, Conn.
Wesley Roswell Coe,	Instr. at Yale,	2 Hillhouse Ave., New Haven, Conn.
Henry Bacon Hubbard,	Bookkeeper,	21 Orman Place, Brooklyn, N. Y.
George Henry Knowles,	Gardener,	Ellington, Conn.
Keeney B. Loomis,	Farmer,	So. Manchester, Conn.
Harry Lincoln Quinlin,*		
Charles William Roberts,	Farmer,	Middletown, Conn.
Clarence Henry Savage,	Farmer,	Storrs, Conn.
Charles Augustus Wheeler,	Instructor,	Storrs, Conn.

1889.

Merton Chapman,	Nurse,	Groton, Conn.
Samuel Hart Deming,	Cream Gatherer,	Box 24, Farmington, Conn.
Fred Alfred McKenzie,	Emp'd in Mfy.,	Atlantic Screen Co., Hartford, Conn.

* Died Feb. 24, 1893, at Newfield, Conn.

1890.

Ernst Hamilton Brandt,	Mfg. Rub.Wks., 18 South St., Mt. Vernon, N. Y.
Merrill Everett Brown,	Shipping Clerk, 68 Huntington St., New London, Conn.
Charles James Gilmore,	Address not known.
Wilbur Lionel Goodenough,	Salesman, Winchester Ctr., Conn.
Latham Hull,	Stock Breeder, No. Stonington, Conn.
John Hunter Lacke,	Lawyer, 177 Montague St., Brooklyn, N. Y.
Carlton Elbert Lane,	Grain Dealer, 481 E. Main St., Meriden, Conn.
Clarence Bronson Lane,	Asst.in Ex.Sta., New Brunswick, N. J.
George Neth,	Electrician, 50 Seymour St., Hartford, Conn.
Charles Backus Pomeroy, Jr.,	Farmer, Willimantic, Conn.
Robert Garland Shepard,	Address not known.
Adolph Carl Sternberg,	Fruit Grower, West Hartford, Conn.
Willis LeRoy Wetmore,	Farm Supt., Winchester, Conn.

1891.

Herbert Porch Caldwell,	Salesman, 234 Putnam St., Hartford, Conn.
Charles Vibert Chandler,	Grocery Clerk, South Windsor, Conn.
Walter Ernest Cummings,	Hardware, Worcester, Mass.
James Sumner Fowler,	Fruit Grower, Florida.
John Carter Frisbie,	Farmer, Southington, Conn.
Alfred Herbert Griswold,	Mechanic, New Britain, Conn.
Arthur Gilbert Hall,	Salesman, 104 So. Colony St., Meriden, Conn.
Harry Grant Manchester,	Farmer, Sta. A, Winsted, Conn.
George Henry Merwin,	Farmer, Greenfield Hill, Conn.
Fred Rosebrooks,	Farmer, Willimantic, Conn.
Walter Lyman Rosebrooks,	Hardware, Worcester, Mass.
Charles Herbert Vibert,	Farmer, Meriden, Conn.
Allen Rice Yale,	Farmer, Meriden, Conn.

1892.

Charles George Allen,	Bookkeeper, Turnerville, Conn.
Seth Herbert Buell,	Student, Oberlin, Ohio.
Aaron William Fenn,	Farmer, Plymouth, Conn.

Henry Edward French,	Salesman,	Hartford, Conn., Care Dodge & Brewer.
George Henry Hall,	Salesman,	Manchester, Conn.
Walter Holden,	Salesman,	6 Franklin St., Norwich, Conn.
Walter Francis Schultz,	Gardener,	103 Woodland St., Hartford, Conn.
Herbert Edmund Warner,	Asst. & Stu. in San.,	Battle Creek, Mich.

1893.

Ernest Treat Beard,	Farmer,	Milford, Conn.
Walter Harley Bishop,	Farmer,	North Haven, Conn.
Charles Henry Brimble,*		
Frederick William Darnstedt,	Electrician,	Willow St., Hartford, Conn.
William Bailey Dayton,	Farmer,	Plantsville, Conn.
Walter Morgan Dunivan,	Clerk,	21 Cooper St., Brooklyn, N. Y.
Charles Wells Eddy,	Civil Engineer,	Simsbury, Conn.
Edward Blodgett Fitts,	Farmer,	N. Lebanon Ctr., N. Y.
William James Frey,	Bookkeeper,	Box 306, Hartford, Conn.
Martin Moore Frisbie,	Farmer,	Southington, Conn.
Harvey Clark Harrison,	Farmer,	Northford, Conn.
Martin Hibbard Parker,	Farmer,	So. Coventry, Conn.
Frank Curtis Osborne,	Merchant,	Pier 14, East River, New York City.
Homer Gurley Sperry,	Farmer,	So. Manchester, Conn.
Walter Arnold Warren,	Asst. Hort. Dept.,	Storrs, Conn.

1894.

Charles H. Brimble,*		
Hobart James Brockett,	Farmer,	Montowese, Conn.
Seth Herbert Buell,†	Student,	Oberlin, Ohio.
John Carter Frisbie,†	Farmer,	Southington, Conn.
Harvey Clark Harrison,†	Farmer,	Northford, Conn.
Martin Hibbard Parker,†	Farmer,	So. Coventry, Conn.
Louise Jane Rosebrooks,	Housekeeper,	So. Coventry, Conn.
Walter Francis Schultz,†	Gardener,	Hartford, Conn.
Anna Mabel Fitts, nee Snow,		E. Windsor Hill, Conn.

* Died June, 1900, at Hartford, Conn.

† Post Graduates.

Herbert Edmund Warner,†

Student and Asst.

in Sanitarium, Battle Creek, Mich.

Nellie Louise Bingham, *née*

Wilson,

Mansfield, Conn.

1895.

Francis Ariel Bartlett,

Farmer,

Simsbury, Conn.

Martin Moore Frisbie,†

Farmer,

Southington, Conn.

Charles Robert Green,

Mailing Clerk,

161 Seymour Street,
Hartford, Conn.

George Ransom Hall,

Empl'y'd in Mfg., Hartford, Conn.,

Care Veeder Mfg. Co.

Arthur Joseph Pierpont,

Farmer,

Waterbury, Conn.

Arthur Edward Shedd,

Farmer,

Preston, Conn.

William Alonzo Stocking, Jr.,

Instructor,

Storrs, Conn.

Arthur Hatch Sturdevant,

Farmer,

Bridgewater, Conn.

Albert Buckingham Tyler,

Farmer,

Bristol, Conn.

1896.

Howard Grant Barber,

Teacher,

Union, Conn.

Grace Emily Eddy, *née*

Blakeman,‡

Housekeeper,

Simsbury, Conn.

Olive Nicholson Clark,

Housekeeper,

Old Saybrook, Conn.

Albert Ernest Coles,

Rockfall, Conn.

Clayton Theron Curtis,

Farmer,

E. Glastonbury, Conn.

John Harry Evans,

Physic'n & Surg., New York City, N. Y.

Ethel Eugenia Freeman,

Clerk,

Chaplin, Conn.

Olcott Frederick King,

Farmer,

South Windsor, Conn.

Grace Edith Snow,

Teacher,

Jewett City, Conn.

Leroy Minor Tucker,

Farmer,

Middletown, Conn.

Ernest Henry Waite,

Landsc'pe Gard., East Litchfield, Conn.

1897.

Harry E. Atwood,

Farmer,

Middletown, Conn.

Robert D. Beardsley,

Clerk,

Plymouth, Conn.

Frederick N. Buell,

Business,

Detroit, Mich.

Fred F. Bushnell,

Student,

Ithaca, N. Y.

Francis Comber,

Clerk,

Elmwood, Conn.

John N. Fitts,

Farmer,

East Windsor, Conn.

† Post Graduates.

‡ Married November 9, 1899.

Charles L. Foscett,	Farmer,	Winsted, Conn.
Erma L. Webb, <i>née</i> Fuller,	Housekeeper,	Plymouth, Conn.
Albert C. Gilbert,	Student,	Northfield, Mass.
R. D. Gilbert,		Address not known.
Arthur O. Green,*		
Grove H. Johnson,	Lecturer,	Winch'ter Center, Conn.
Victor E. Luchinni,	Clerk,	Boston, Mass.
Harry B. Luce,	Farmer,	New Britain, Conn.
Benjamin S. Taylor,	Farmer,	So. Glastonbury, Conn.

1898.

Dennis Julian Burgess,	Stenographer,	Storrs, Conn.
Charles Sydney Chapman,	Student,	New Haven, Conn.
Charles Stoddard Francis,	Farmer,	Newington, Conn.
Harry Lucian Garrigus,	Asst. Exp. Sta.,	Storrs, Conn.
Walter Stanley Gillette,		North Haven, Conn.
Willis Nicholas Hawley.†		
Herbert Kirkpatrick,	Farm Supt.,	Plattsburg, N. Y.
Edwin Shepard Mansfield,		North Haven, Conn.
Herman Frederick Onthrup,	Student,	Middletown, Conn.
Joseph William Pincus,	Instructor,	Woodbine, N. J.
Max Schaffrath,	Student,	Amherst Agr. College.
Clinton Gold Smith,	Forestry Dept.,	Washington, D. C.
George Ernest Smith,	Surveyor,	Derby, Conn.
Norman James Webb,	Machinist,	Plymouth, Conn.

1899.

Selma Alida Carlson,	Teacher,	Mansfield, Conn.
Frank Dexter Clapp,	Fruit Culture,	Cromwell, Conn.
Roscoe Hoskins Gardner,	Florist,	Cromwell, Conn.
Irvin Edson Gilbert,	Unknown,	Deep River, Conn.
Arthur Franklin Green,	Dairyman,	Middlebury, Conn.
Ida Louise Hobby,	Housekeeper,	Mansfield, Conn.
Willard Whitaker James,	Surveyor,	North Windham, Conn.
Elsie Sophia Leach,	Unknown,	Plymouth, Conn.
Willard Ernest Mason,	Civil Engin'ring,	Mansfield, Conn.
Edward Francis Manchester,	Farmer,	Bristol, Conn.
George Harry Miner,	Student,	Cornell University, N. Y.
Willis Mills Nettleton,	Farmer,	Wash'gton Depot, Conn.

* Died April, 1898, at Hartford, Conn.

† Died at Philadelphia, November 19, 1898. First Sergeant, Company H, Third Regiment, Connecticut Volunteers.

Bertha May Garrigus, *née*

Patterson,*	Housekeeper,	Storrs, Conn.
Clarence Dwight Smith,	Farmer,	Westminster, Conn.
Benjamin Hovey Walden,	Dept. of Agr.,	Washington, D. C.
Cassius Way,	Student,	Cornell Univ., N. Y.
Elmer Clinton Welden,	Dairyman,	Storrs, Conn.
Katherine Rosetta Yale,	Housekeeper,	Meriden, Conn.

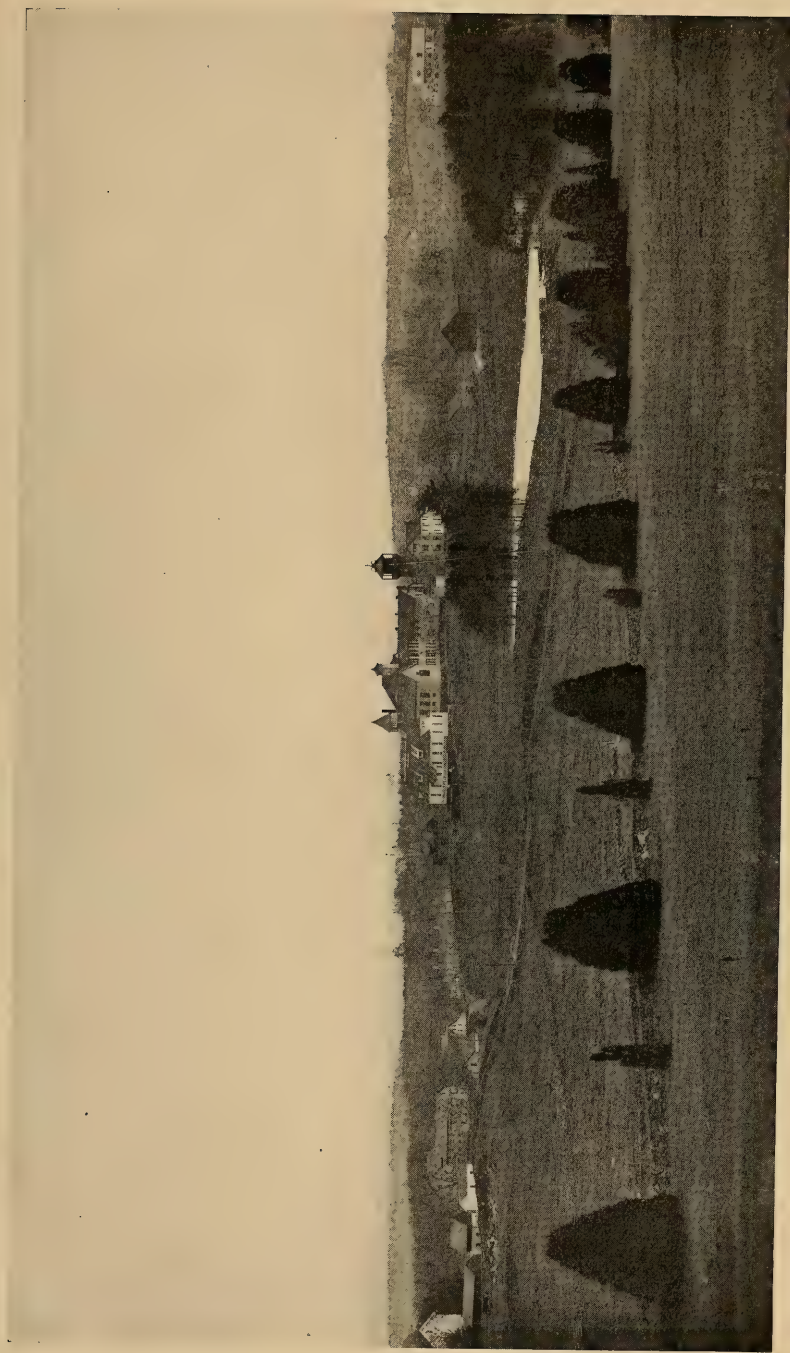
Graduates, upon changing their address, are requested to communicate with the President of the College, that the above list may be kept up to date; and the aid of class secretaries and all others is solicited, that the list may be properly revised each year.

SUMMARY.

Total number of students graduated up to 1901, one hundred and eighty-one, of whom twenty-two are women.

Farmers,	69	Mechanic,	1
Manufacturers,	8	Salesmen,	8
In trade,	4	Clerks,	5
Buffer,	1	Dentist,	1
Express Agent,	1	Signal Service,	1
Lawyers,	2	Electrician,	1
Vet. Surgeons,	3	Civil Engineers,	3
Medicine,	1	Lecturer,	1
R. E. Dealer and Broker,	1	Liveryman,	1
Bookkeepers,	3	Nurse,	1
Architects,	2	Students,	11
Teachers,	9	Housekeepers,	7

* Married to Harry Lucien Garrigus, '98, November 29, 1899.



CONNECTICUT COLLEGE—REAR VIEW

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